SCIENTIFIC AMERICAN

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ELECTRO-PLATING MACHINERY.

There are many advantages in an electro-deposit of nickel, silver, gold, etc., to prevent and protect the surfaces of inferior metals from oxidation, but the source of electricity from the various batteries employed has always been an obstacle to its greater development.

In the machine we illustrate there is shown a mechanical source of electricity of constant uniform power, light cost of running, and of easy management. Mr. Edward Weston, a practical electro-metallurgist, and the electrician of the Weston Dynamo-electric Machine Company, of Newark, N. J., is the inventor, and Condit, Hanson & Van Winkle, also of Newark, are the agents.

The interior of a large plating works is shown in the cut, Fig. 1. The dynamo-electric machine, as it is termed, and the method of driving it is shown upon the right. It is rotated about 800 revolutions per minute, and furnishes the current for plating. It is connected by means of wires to rods running across the various tanks containing the metal solution to be deposited. On the tanks are rods supporting the anodes or metals to be deposited, and also the work to be plated.

It is usual to place the tank containing the nickel solution nearest the machine, as this solution offers the greatest resistance to the electrical current. A solution of cyanide of copper is used in many cases as an intermediate deposit upon iron or steel before the nickel, as it prevents the tendency to rust upon exposure. This solution is also used for depositing copper on zinc and lead, or articles made up of several metals.

In Fig. 3 is shown a cut of the Weston dynamo-electric machine. As will be observed, an iron cylinder, D, forms the outside of the machine, and is attached to a wooden base. From the interior of this cylinder a number of radially projecting magnets are arranged, all pointing to a common center. These magnets consist of a case of iron, to which are fastened a number of tempered steel plates, insulated with copper wire, in the manner usually employed in making electro-magnets. They are so connected that the poles will be alternately positive and negative.

In the central space left between the inward ends of the magnets, is arranged a shaft which is rotated by the pulley, E. A series of armatures made in segments are firmly secured to this shaft. These armatures are of soft iron, and are also wrapped with wire. The outwardly projecting ends are thin pieces of iron, and so arranged that, when they are simultaneously revolved, by the turning of the shaft, these outwardly projecting ends will pass closely, but without touching, the inwardly projecting ends of the magnets. When the shaft, as it carries the armatures, is very rapidly revolved past the electro-magnets, currents of electricity will be induced in the wires surrounding the armatures; but as such currents are constantly changing their direction, a device called a commutator has to be used. This commutator consists of two pieces revolving on the shaft, on which they are mounted. One part is slipped upon the shaft and is insulated from it and from the other part. In construction a thimble of wood is slipped upon the shaft, and upon this thimble a brass washer is placed, to which the wires proceeding from the armatures through a steel bushing containing wooden tubes are passed. One half

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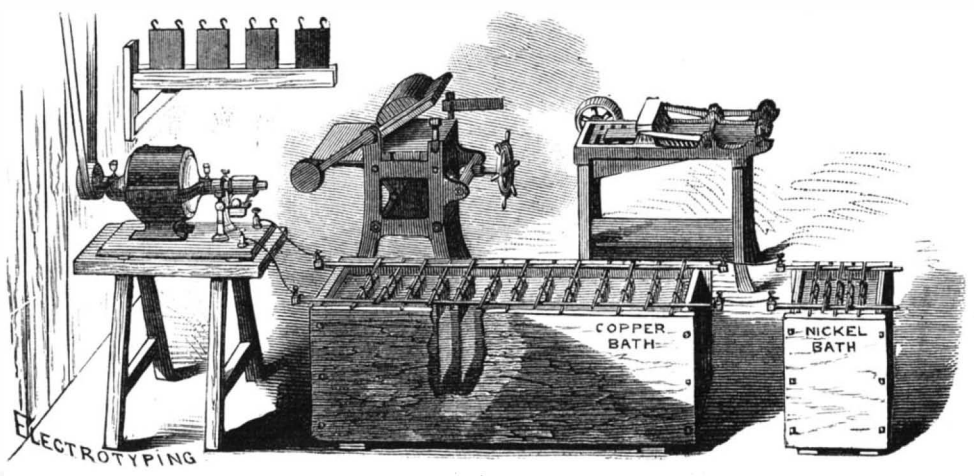
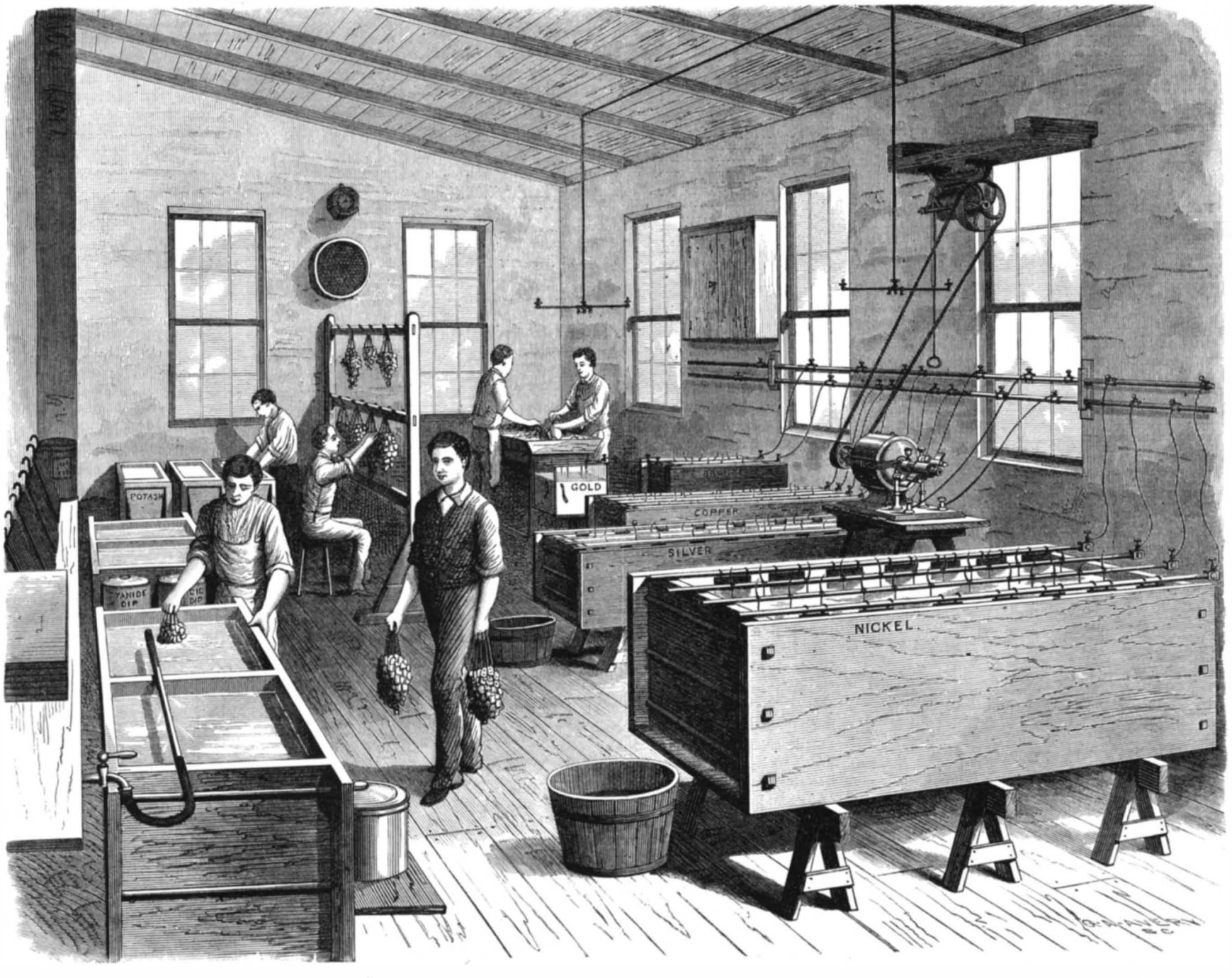


ELECTROTYPING APPARATUS.—FIG. 2.



MACHINERY FOR ELECTRO-PLATING.

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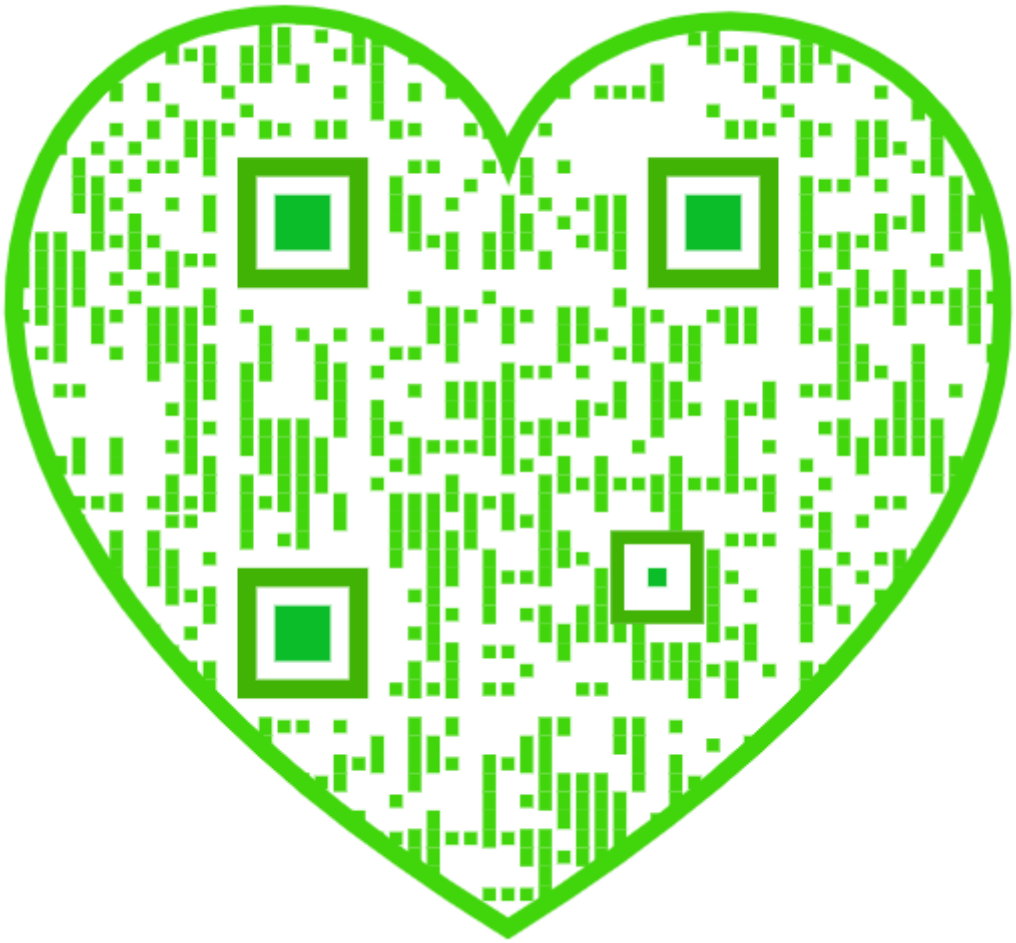

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NEW YORK, SATURDAY, SEPTEMBER 1, 1877.

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HOW SHALL RAILWAY WORKMEN LIVE?

According to the last census the total number of railway employees exclusive of clerks, in this country was, in 1870, 154,027. During the period which has elapsed since the enumeration, our railway mileage has increased from nearly 45,000 to 73,508 miles. Allowing for a proportionate increase in the number of employees, as well as reductions in working force due to economical reasons, it is probably safe to estimate that the railroad workmen of the United States number about 200,000 souls. From the statistical tables given in Poor's "Manual of the Railroads of the United States for 1877-8," it appears that while the gross earnings of the roads have fallen off nearly six million dollars, the net earnings have increased nearly by a million, and this is ascribed chiefly to the great economies practised in conducting the operations of the lines. In furtherance of this system of economy there have been, as our readers are aware, reductions in the wages paid railroad employees. These reductions have been in many cases claimed by the persons affected to render the returns for their labor inadequate for a living support; and accordingly the strike, the usual coercive measure adopted by employees under such circumstances, was resorted to, and characterized unfortunately by acts of lawlessness which rendered the question of restoring the public peace far paramount to any of the other issues involved. When such a course is resorted to, past experience has abundantly proved that failure is the rule. The recent difficulty has shown itself to be no exception, and the contending parties stand to-day in practically the same position as to their causes of dispute as they did prior to the outbreak.

There are certain facts which we believe do not admit of argument which should here be postulated, namely, that in this country at the present time the supply of working men is in excess of the demand, that a railway company, or any other employer, is under no obligation to furnish living incomes as such, and that it has a right to regulate its own rates of payment in accordance with its own best interests. While such is the case, it is obvious that coercive measures to compel an employer to raise wages must prove futile. Until, therefore, through the natural working of the laws of supply and demand some condition of affairs more favorable to the working classes shall come into existence, the problem is not how to force employers to improve matters by increasing the revenue of the working men, but how to do so by enabling the working man to obtain the necessities of living out of the means which he can earn. This we take to be the question of all others which is now pressing for solution with reference to the present labor and capital antagonism.

We find in the New York *Times* a communication, very intelligently written by the wife of a working man, in which she sums up the actual least cost of supporting her family, which includes her husband, self, and five children, the latter under nine years of age. As a matter of statistical information this schedule is of exceptional value. It is as follows:

WEEKLY.		DAILY.	
Rent	$2 00	1 quart milk, 6c	$ 42
1 barrel wood	25	2 quarts potatoes, 6c	42
2 pails coal	16	2 8-cent loaves	1 12
Burial society	22	1½ pounds meat, 20c	1 40
Oatmeal	14	Salt	2
2 pounds butter	60	Pepper	2
3½ pounds sugar	40	Mustard	2
Half gallon oil	9	Matches	1
2 cakes soap	14	Starch	3
1 pound soda	3	Bluing	1
Half pound tea	25		
Newspapers	12	Total	$3 47
Shaving	10		4 50
Total	$4 50	Total	$7 97

Here is 97 cents more than the dollar a day wages which our contemporary's contributor says she undertook to live upon for some time, and failed. Now, the above are retail prices, and the commodities are probably purchased of small dealers, so that the goods have been numerously handled, and repeated profits thus added. It has been determined by Professor Fawcett, the well known English political economist, that the loss incurred by average working men, on account of their articles passing through the hands of shopkeepers, is about 20 per cent. Deducting the $2 rent, and taking off this proportion from the remainder, we have a balance of $4.78 as the actual cost of the food, etc., less shopkeepers' profits. Now the rent quoted amounts to $104 per year, or about one fourth of the total expenses. This is a large proportion to pay for rent. In England the same item amounts rarely to more than one eighth of the amount of wages earned. We find it stated that the general 3 shillings and 6 pence (87 cents) per week dwelling is largely used by families earning 30 shillings ($7.50) per week, which last is about the same as that earned in the case under consideration.

It will be obvious that the problem before us is how to reduce the cost of living to the working man, and of this we may learn something from what has been done in England. There societies for this very object have for some time been in successful existence. The Permanent Building Society, of Leeds, has furnished healthy tenements at very low rates to about 200 families. In Burnley, another society has assisted hundreds by advancing money on mortgages paid by easy installments. The arrangement is such that the workman pays a small subscription to the society until enough has been contributed to warrant the association buying and conveying to him the house in which he lives. The same has been done by large employers, like the Messrs. Ashworth and the late Sir Titus Salt; and in London there is a large corporation called the Industrial Dwellings Company, which now rents 2,799 tenements, capable of accommodating 12,115 people. Not only has this enterprise greatly benefitted the working men, but as an investment, in five years, it has earned large surplus profits after paying 5 per cent dividends. The rent averages about 50 cents a week for an apartment furnished with every modern convenience.

Not only might similar societies be established here: but others might be started for supplying working men with the necessaries of life at prices certainly *minus* the retail profits already noted. These last could evidently be begun on a small scale and with little capital. The railroad companies themselves might establish stores for their men, or benevolent societies such as the Young Men's Christian Association would here find an excellent object for their philanthropic efforts. A few persons in well-to-do circumstances in every railroad town could easily subsidize such sources of supply, and eventually change them into co-operative establishments as the men learned to live on their reduced incomes. Nor need the work of the benevolent end here. Some of the railroad companies now, in order to prevent their men joining unions, afford them all the advantages of life insurances, etc., which the unions offer. Outside societies for this purpose might also be organized. We have benevolent societies for the care of children, for the aged, and for sailors—why not also for railroad employees whose life presents many analogies to that of the sea-faring man.

It may be said that in dealing with so great a class the laws of demand and supply, inexorable as they are, should only be considered, and that philanthropy has here no place. We think otherwise. The life of a railway employee has its duties and dangers which cannot, morally viewed at least, find compensation in the market rate of wages. Here is an immense number of men who in their daily work expose their lives to constant peril, greater, says an eminent statistician, than that of the soldier in battle. They are subject to peculiar and painful diseases, produced by the conditions under which they work; they are subjected to every hardship of inclement weather and of absence from home, and through all they are obliged to keep tireless watch. Their record is one of unflinching devotion to duty, even in the face of imminent death, and to their hands are committed the safety of enormous wealth, vast interests, and human life. The benevolence of the community may safely rest upon such a showing. Mr. W. H. Vanderbilt has already emphasized this fact by his gift of $100,000 to the employees of the New York Central and Hudson River Railroad, over which he presides. This is one good example, and we hope to see it imitated. The workmen, however, do not ask alms—true charity in their case is to show them how to live on what they can honorably earn. And it is by such action as this that strikes may be caused to become forgotten weapons.

EARLY CONNECTICUT MANUFACTURES.

Very few of our readers are aware that patents, or exclusive privileges to manufacture certain articles, were granted by some of the colonial governments, but such is the fact. The General Assembly of Connecticut took the lead in this encouragement of the growth of infant manufactures, and it is therefore very probable that this is the reason why so much manufacturing is carried on within her borders, and so many of her sons are engaged in the same line in other States.

In addition to the special grants hereafter given, the Assembly passed at least three general acts for the encouragement of discoveries and inventions; one of which, passed in 1663, related solely to the discovery of mines; a second, dated 1672, was enacted for the same purpose, but it had an additional section which forbid the passing of monopolies, "except for such new inventions as shall be judged profitable to the country, and for such time as the General Court shall deem meet;" and a third act, passed in 1715, enacted "That if any person or persons shall set themselves on work to discover any commodities that may be of use for the country, for the bringing in a supply of goods from foreign parts, that is not as yet of use among us, he that discovers it shall have due encouragement granted to him and the adventurers therein" (Statutes of 1715, p. 5).

Many of the special privileges granted will be found to be more of the character of monopolies, or bounties for the introduction of new trades and manufactures, rather than patents for new inventions, but the latter are not wanting.

The first individual or private grant that we find is that issued to John Elliot, in 1708, which gave him the exclusive right for ten years of manufacturing pitch, provided he started the manufactory within two years.

In 1717, E. Hinman obtained a grant giving him the exclusive right to make molasses from corn stalks for ten years—a right which he probably would have found no one to interfere with if he had not had the grant.

A third grant, issued in 1718, gave the exclusive privilege for 20 years of setting up oil mills for the manufacture of linseed oil, to Messrs. Prout, Mansfield & Atwater.

The next patent appears to be one issued to Ebenezer Fitch, in May, 1728, which granted to said Fitch and Co., the exclusive right for 15 years of erecting slitting mills, "to slit and draw out iron rods for nails, and other artificers in iron."

In the same month a patent was granted to Samuel Higley and Jos. Dewey, giving them for ten years "the sole practicing of the said art of steel making," which "said art" seems to have been a method discovered by them of converting iron into steel by the cementation process.

Another patent was issued for a similar process to Messrs. Fitch, Wyllys & Walker, in 1740, for fifteen years, on condition that they should begin operating within two years.

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This proviso, however, they failed to keep, owing to the death of the capitalist they had engaged to help them to the necessary funds; and in consequence, at the end of three years, we find them making an application for the renewal of their grant, which was done and, as other documents show, they succeeded in making good steel in considerable quantities.

In May, 1741, the exclusive right of making potash for 20 years was given to Messrs. Willard, Hamlin, Wetmore, Chauncey & Fairchild.

In 1746, John and Stephen Jerom obtained the exclusive right for 14 years of making salt by evaporating sea water; and three years after procured a loan from the Assembly of £1,000, for two years, to enable them to continue their operations, as they had not yet succeeded commercially for want of sufficient capital.

The exclusive privilege of making glass for 20 years was given, in 1747, to Thomas Darling, on condition that he and his assignees should set up suitable works and prepare a stock of materials within four years, with a further proviso that they should make at least 500 feet of good window glass every year thereafter.

It would appear that Darling did not succeed in introducing the manufacture of glass, for in 1779 we find a grant giving "during the pleasure of the Assembly," to Messrs. Hubbard, Mosely, Little & Latimer, a similar exclusive privilege, except that only one year was given in which to commence operations. Before this year had expired, however, a memorial was filed by Mosely and Little, stating that Hubbard and Latimer had withdrawn on account of the great expense and risk, and asking that they (Mosely and Little) may be allowed to raise £2,000 by a lottery. This lottery privilege does not appear to have been granted, but instead an exclusive right for 15 years was given on the same conditions as the last.

This project would also appear to have failed, for we find another exclusive grant, three years after, to Pitkin, Bishop & Pitkin, for the term of 25 years, on condition that they began manufacturing within three years. These parties also seem to have met with little or no success, for we find a memorial from them complaining of the discouragements they had met with in their efforts, and asking that a lottery may be granted to them for the purpose of raising £400, which was allowed.

In 1753 a grant of the exclusive privilege, for 15 years, of setting up "a new invented water machine for the dressing of flax," was given to Jabez Hamlin and Elihu Chauncey.

A bounty of 2*d.* per quire of writing paper and 1*d.* per quire of printing paper or coarser paper, was ordered by the Assembly in 1768 to be paid to C. Leffingwell on all paper made by him; which appears to have been done for one year only, during which he made 4,020 quires of writing paper and 10,600 of inferior quality, after which the bounty was discontinued.

Another document, a memorial from Abel Buell, dated October 8, 1766, states that the writer had been sentenced to imprisonment for life for "altering the bills of public credit," which sentence had been remitted on account of his youth; and after stating that he had discovered a method of grinding and polishing crystals, asks that the privileges which he "had justly lost" might be restored to him, that he might carry on the aforesaid business. On his giving bonds as to future good behavior, this was done.

Three years after we find another petition from the same man stating that he had discovered the art of letter founding, and asking that he be allowed to "raise money by lottery to carry on the same, or in some other way." With the memorial he furnished specimens of his handiwork, which are said by those who have seen them to have been superior to the type of that day and equal to the average of that of a much later date. A committee of the Assembly was ordered to investigate the project, and on their favorable report the treasurer was ordered to loan Buell £100 at at once and another £100 at the end of a year, on condition that he give a bond in £200 that he would pursue said business and would not leave the colony within seven years. It appears, however, that he did not meet with much success, for we find a petition from his wife, dated August 8, 1777, stating that the long absence of her husband made her despair of ever seeing him again, and requesting the Assembly to be allowed to pay £100 in full of all demands against them, which the Assembly accepted.

In 1774, George Phillips applied for and obtained the privilege of refining loaf sugar for ten years, which was to be exclusive, except that the Assembly retained the option of allowing two other refineries to be set up, and during the next two years granted such permits to other parties.

A patent was issued in the same year, granting to John Shipman for 40 years the exclusive privilege of erecting within certain territory his newly invented tide grist mill, on condition that it should be erected within five years.

Under the date of February 3, 1776, we find that the sum of £60 was ordered to be paid David Bushnell, as some encouragement for him to proceed in preparing his machine for blowing-up ships, etc. No particulars of the plans appear on the files, but from other sources we learn that this, "the American Turtle," as it was called, the prototype of the modern torpedo boat, was composed of two shells joined together water-tight, and of sufficient capacity to contain the operator and air enough to support him under water for half an hour. The "turtle" was caused to rise or sink by pumping the water from or allowing it to enter into a chamber beneath him, at the same time lowering or raising an ingot of lead of 200 lbs. weight, which might be made to touch bottom. The propelling force was an oar worked from a compartment in the forepart; and at its stern a magazine of powder was attached, which could be detached and secured to, or sent against another vessel. The magazine was provided with a gun-lock to fire the powder, which was operated by clockwork calculated to run sufficiently long after being set in motion to allow the operator to reach a place of safety previous to explosion. With this apparatus he made an attack on the British ship "Eagle," of 64 guns, in New York harbor, but only succeeded in frightening the crew, although he afterwards succeeded in blowing up a schooner at New London.

In 1778, the Assembly granted permission to two widows named Hannah Watson and Sarah Ledyard, to raise £1,500 by lottery to rebuild a paper mill owned by them, which had been destroyed by fire. From a statement in their memorial, it appears that the Hartford newspapers of that day circulated about 8,000 copies weekly.

In 1783, a patent was granted to Benjamin Hanks for fourteen years for "a clock or machine that winds up itself by help of the air, and will continue to do so without any other aid or assistance until the component parts thereof are destroyed by friction." This was probably a clock provided with a windwheel set in such a position that the heated air escaping from a room would operate the wheel and so keep the clock continually wound. A clock similar to this was patented to Robert Hitchcock, September 10, 1861.

The exclusive right to make snuff was granted to William Pitkin in 1784, for 14 years.

In 1787, an act was passed giving to Samuel Loomis the exclusive right of erecting works for the manufacture of wool, cotton, hemp, flax, and silk, "upon a new constructed plan," on the east side of the Connecticut river, or within ten miles west thereof, for seven years, and an exclusive privilege for seven years longer on any ground within thirty miles of such works.

In addition to the above we find a number of rejected applications for special privileges in manufacturing various articles, from pins to perpetual motions. (The perpetual motion man's memorial was endorsed "Prisoner in jail.") Some of the applicants wanted an exclusive right only; others wanted loans from the Assembly—some with interest and some without; and still others, to enable them to start the manufacture of some article not then made in the colony, petitioned for the privilege of raising stated sums of money, ranging from £100 to £6,000, by means of lotteries—which last appears to have been a favorite mode of "raising the wind" in those days, if we may judge by the number of applications for the privilege.

From another series of documents, too long to give even a synopsis of them here, we find that considerable attention was given to the manufacture of iron, both cast and wrought, and that as far back as 1736 iron works were building in Salisbury, where during the revolutionary war about 60 men were employed in casting cannon alone, to say nothing of other work.

NOTES OF PATENT OFFICE DECISIONS.

PATENTS.

In the recent interference case of Anson *vs.* Woodbury, the Commissioner of Patents has decided that the Patent Office will take judicial notice of matters of public notoriety affecting the right of an applicant to a patent. Anson applied for a patent for the use of a presser bar in a planing machine, but the Commissioner holds that, as a matter of public notoriety, presser bars of the description claimed by Anson have been in public use for upwards of twenty years, in support of which he cites the SCIENTIFIC AMERICAN for July 5, 1873, vol. 29, p. 7; and November 20, 1875, vol. 33, p. 25. He therefore dissolves the interference and rejects Anson's application. The rule is laid down in this case that, on a motion to dissolve the interference on the ground of notorious public use for more than two years prior to the filing of the application for the patent, *ex parte* affidavits made by adverse parties cannot be received to impeach the patentability of the applicant's invention. It is immaterial that such affidavits were not submitted to show any particular instances of use, but rather to show notoriety of use. In admitting and considering such affidavits as evidence, the Patent Office would be adjudicating upon the rights of applicants on testimony not taken in accordance with any requirements of law, and of witnesses which the parties in interest had no opportunity to cross-examine.

A claim for an improvement in ant-guards, consisting of a concave flange, arranged on the leg of a table or other piece of furniture, and coated on the under side with chalk, is decided in the case of Strong *vs.* Cruikshank to be lacking in patentable novelty. The peculiar property possessed by chalk, rendering it an impassable barrier to the march of ants, is well known, and the use of concave flanges on corn-cribs, trees, etc., to prevent the ascent of insects is old in the art. The only novelty that could be claimed, therefore, was the fact that protection was afforded by the flange to the chalk. This is not patentable, since it is but the exercise of simple intelligence to put the chalk on the under side of the flange, where it is best protected from being rubbed off.

On the application for a reissue of letters patent in the case of a machine patent, the model and drawings cannot be amended except each by the other, and the Commissioner cannot go outside of the record to ascertain what was the scope or detail of the original invention. Thus in the case of Stockwell *vs.* Haines, just decided, the Commissioner rejects affidavits offered to prove that a certain pin—not shown in the drawing or specification, although there was a horizontal perforation in the model, in which such pin might be placed—did form a part of the original invention. An invention not set forth in the original specification, nor fully shown in the original drawings, cannot be incorporated on reissue, where its existence depends upon the restoration of a missing element to the model in a particular position, it not appearing that such position is necessarily the only one it can have, and both original specification and drawings failing to indicate its location.

TRADE MARKS.

An application for the registration of an arrangement of a star and crescent as a trade mark for soap was lately filed by Cornwall & Brother. The Examiner of Trade Marks referred them to a registered trade mark consisting of the figure of a star alone, also applied to soap, and contended that the employment of the combined symbol of a star and crescent would be likely to deceive parties desirous of purchasing soap having the brand of the star alone. This decision has just been reversed on appeal.

The fact is referred to that the flags of two nations are distinguished by almost the same difference in symbol as that employed by Cornwall & Brother to distinguish their soap from that made by the owners of the registered trade mark. The flag of Egypt is a crescent on a red ground, and the Turkish man-of-war flag is a crescent and star on the same colored ground, but there is no mistaking one flag for the other by persons of the slightest discernment; and the same may be said when those symbols are applied in a similar way to the soap of two different owners.

The application for the registration of the figure of a "swan" with the words "Our London Swan Gin" as a label is refused to John D. Park. The figure of a swan with some other arbitrary matter had previously been registered by other parties as a trade mark applied to this article. The Commissioner decides that as Park's label includes arbitrary and fanciful words and figures constituting a proper trade-mark, in addition to matter properly a label, he should first register the fanciful matter as a trademark; but before he could do this, under the circumstances, he must first establish his right to the trademark. This he could do by proof adduced in an interference proceeding, or by an adjudication of a court of competent jurisdiction establishing his title to the same.

MUSCULAR CONTRACTION AND ELECTRICITY.

Muscular contraction is always accompanied with electrical phenomena. The difference of electric force between two points of a muscle undergoes a diminution, which, according to Beunstein, precedes the contraction by $\frac{1}{100}$ of a second. M. De la Roche has recently examined the electrical power of the human heart. The electrodes consisted each of a plate of amalgamated zinc with a pledget of muslin saturated with sulphate of zinc at the lower extremities. These were applied, one with its muslin wad opposite the heart on the left breast, the other on another part of the chest, and connection was made with a capillary electrometer. The mercury column executed a very distinct series of periodic pulsations, synchronic with the pulse. Each pulsation marked the double movement of the heart. The result obtained corresponded to $\frac{1}{1000}$ of a Daniell element.

BOILER TEST CHALLENGE.

To the Editor of the Scientific American:

Being an interested party at the Centennial boiler test, and knowing that the Root boiler is ahead, according to the official report issued by the Director-General, Hon. A. T. Goshorn, and as certain interested parties have put restrictions on the further issuing of the report as officially made, and as Messrs. Babcock & Wilcox are not satisfied with the result, we propose to make an economy test against them at the American Institute this fall, for from one thousand to five thousand dollars a side, each party to select one man and those two to select the third, as judges, they to make all rules and regulations, and their report to be final.

Yours respectfully,

ABENDROTH & ROOT MANUFACTURING COMPANY.

New York, August 16, 1877,

Professor Edward Heis.

The death is announced of Professor Edward Heis, of Munster, one of the most assiduous and accurate observers in those branches of astronomical research which can be cultivated, without any powerful instruments, by means of observations made with the naked eye. He was born in 1806. He made observations of the relative magnitudes of all stars visible to the naked eye, the results of which were embodied in his *Uranometria Nova*, published in 1843, the first really trustworthy Star Atlas. Heis, being gifted with eyes of uncommon acuteness, devoted many years to the observations requisite for a greatly improved edition of this work. Variable stars, shooting stars, auroras, the zodiacal light, the course of the Milky Way, etc., were diligently observed by Heis, and his publications referring to them are of great value.

Seeing the Crescent of Venus.

Mr. D. H. Temple, of San Francisco, Cal., informs us that he saw the crescent of Venus at Mazatlan, Mexico, on the morning of January 24th last. This is considered a very difficult feat of vision.

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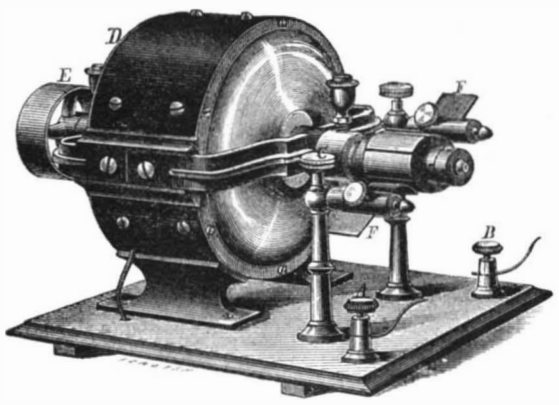
[*Continued from first page.*]

of the commutator slips over the shaft and rests upon the thimble, and is pressed against this brass washer; the other half of the commutator slips upon the shaft, but there is

Fig. 3.



placed between the two halves a thin rubber washer, so as to insulate them from each other. The ends of the wires from the armatures are connected to the shaft, and through the shaft to that half of the commutator which bears upon it. A nut is used to keep the two parts of the commutator together and upon the shaft. Two springs, F F, made of thin, hard rolled sheet copper—silver plated to prevent oxidation—are used to secure good contact with the commutator. These springs are fixed in adjustable clamps, C, supported on brass pillars.

The operation of the machine is as follows: When the apparatus is first made, the electro-magnets are for a moment connected to a battery, or other source of electricity which renders them permanently magnetic. Now if a belt from any source of power be put on the pulley, E, and the machine set in motion, weak currents will be induced in the wires surrounding the armatures, which are picked up by the springs, F F, and carried to the two pillars. If the two wires, A and B, leading from coils of the electro-magnets be placed in contact with these pillars, the weak currents will pass around the electro-magnets and will strengthen them; this will again increase the strength of the currents induced in the armatures, and so on until a maximum is reached. To utilize the currents from such a machine, it would be simply necessary to place the work to be done in circuit with the electro-magnets and armatures, so that the currents induced in the armatures may pass through that circuit, and through the coils of the electro-magnets.

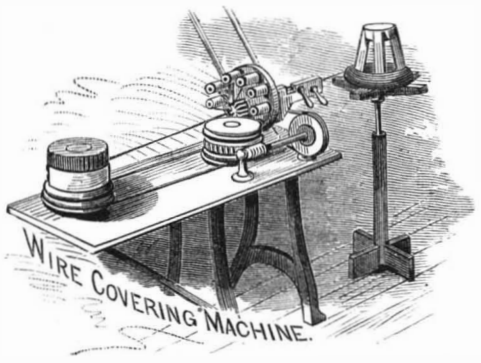
The machine as described would have limited applications, as the currents resulting from the polarization of the electrodes in the vat would, when the speed of the machine fell below a certain point, reverse the polarity of the electro-magnets and the direction of the current, thus undoing what it had previously done, and spoiling the work.

In order to prevent this an automatic device called a governor is employed, which accomplishes the purpose admirably. A metal pillar is fixed to the base of the machine, on the top of which is a cup containing mercury, which cup is made to rotate by a belt running from the shaft of the machine. At a little distance from this pillar is placed another one, with its top part at a right angle and projecting over the cup of mercury. An amalgamated wire is so adjusted in the end of the bent portion that it just touches the mercury in the cup. If the cup be stationary, the mercury will remain in the bottom of the cup; and there is a metallic connection. If the cup be rotated the mercury will rise on the sides of the cup by centrifugal action, and the connection is broken. Fig. 4 shows the process of covering the wire for the magnets, and in Fig. 5 the process of winding them. One of the machines is also shown in Fig. 2 as arranged for work, together with tanks, press, black-leading machine, and other paraphernalia used by electrotypers—electrotyping being one of the uses in which the machine is largely employed. A shell can be obtained by the machine in from 2 to 2½ hours, being equal to that from the usual batteries employed in 10 to 12 hours.

Among the advantages of the machine, as used for electro-plating, is the automatic adjustment of current to the surface of the work to be plated, preventing the burning of small quantities of work; economy by dispensing with batteries; a saving of time and cost of material, as the machine supplies the current the moment the power starts it; uniformity of deposit, as a given speed always gives the same results. A deposit can be made in about one half the time used by batteries.

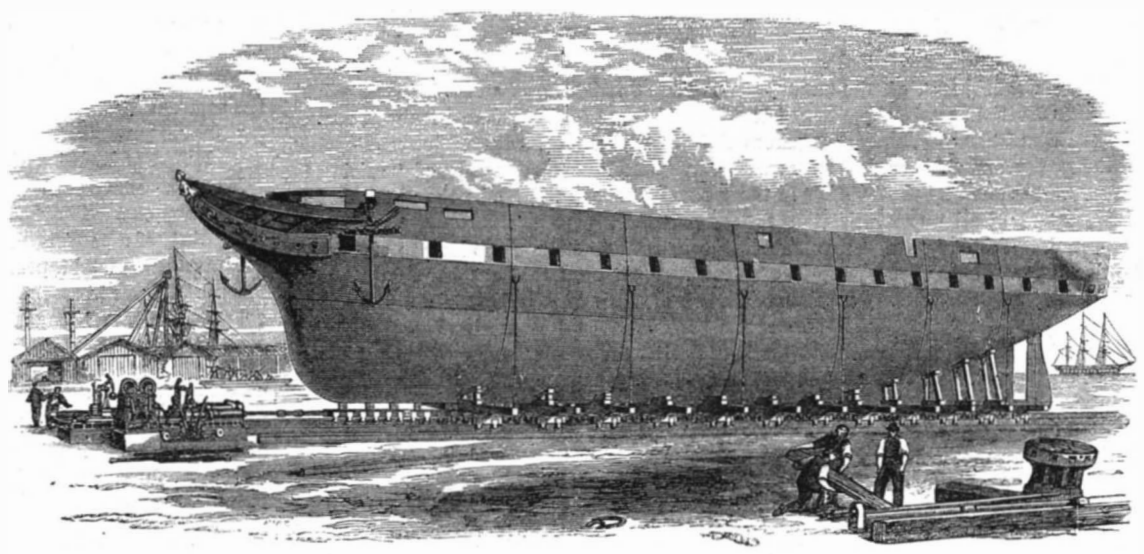
The machines are made with 6, 8, 12, and 16 inch cylinders. The 12 inch machine is considered as a standard with

Fig. 4.



electrotypers and in large electro-plating establishments. They are in some of the largest silverware plating establishments in the country, and are also being rapidly adopted by manufacturing jewelers, etc.

Further information regarding the machines may be obtained of the agents, Messrs. Condit, Hanson & Van Winkle, 236 Market St., Newark, N. J., who are also manufacturers of nickel and electro-plating material, chemicals, etc.



HYDRAULIC HAULING MACHINERY FOR INCLINED SLIPS.—Fig. 1.

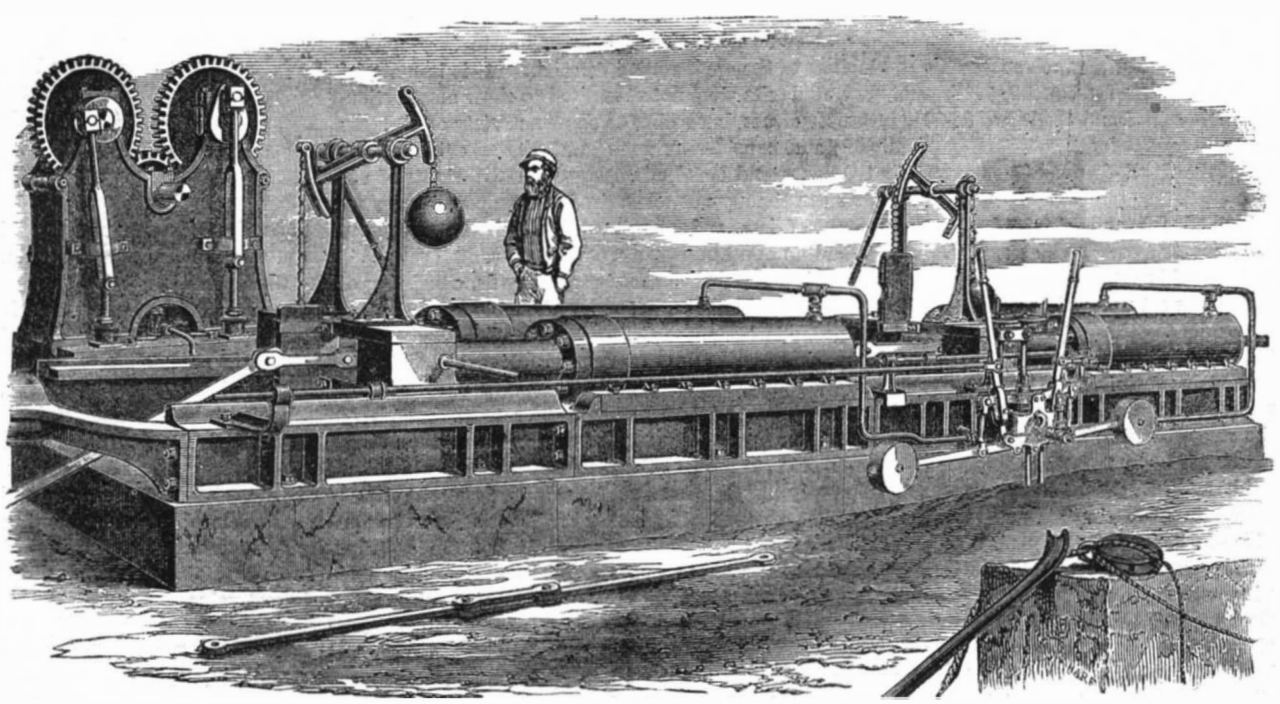
IMPROVED HYDRAULIC HAULING MACHINERY.

We illustrate herewith from *Engineering* a new arrangement of hydraulic machinery for raising vessels up inclined slips, and by which the delay and other inconveniences arising from intermittent action are avoided. Hydraulic machinery for this purpose has for a number of years superseded the less efficient application of steam power, and the cruder ar-

Fig. 5.

rangement of capstans worked by men or horses. One of the great objections to the older systems of lifting arose from the fact that, at intervals corresponding to the stroke of the ram, the forward movement of the cradle had to be arrested until one length of the traction rods was removed and the ram brought back and connection made with the next section of the traction rod. Such a process is unavoidably slow, while the successive arrests of the cradle expose the ship to a series of shocks and a liability to strain. These difficulties are removed by the arrangement illustrated, which was designed by Mr. George Jenkins, of Portsea, England. It consists, as shown in Fig. 1 and in detail in Fig. 2, of four hydraulic cylinders laid parallel and in pairs as shown. The rams of each pair are connected by a crosshead through which the traction links pass, these latter extending down the slip to the cradle and being supported by a central guide rail. On the top of each crossshead are bolted two standards, through the upper ends of which passes a horizontal shaft. In the center of this shaft is keyed a double segment, one arm of which is weighted as shown. On the end of each horizontal shaft a hand lever is fastened. On the other arm of the segment is attached a chain carrying at its lower end an iron block serving as a stopper, and so placed as to drop, while the segment is depressed, between a short pair of links in the traction rod. These links are placed at regular intervals corresponding to the stroke of the rams. The balance weight on the segment maintains the stopper in the position shown in the further pair of cylinders when there is no pressure against it; and by turning the lever on the end of the horizontal shaft the stopper is thrown down into its place between the short pair of links and against the crosshead which couples the pair of rams.

The action of the machine is as follows: When the traction rods have been connected to the cradle and led up to the cylinders, the forward stopper is depressed into its position between the links, and the rams are put in motion, carrying forward the traction rod, and hauling the vessel up the slip. Immediately before the travel of the first pair of rams is completed the second stopper is thrown down to engage between another pair of links, and the other two rams then are set in motion, continuing the work. As soon as the strain is thus taken off the first stopper, the latter is raised clear of the links by the balance weight on the segment, and is thrown down a g a i n only when the second pair of rams has nearly completed its stroke, when the operation is repeated, the rams having been previously run back, hauling the cradle up proceeds.



HYDRAULIC HAULING MACHINERY FOR INCLINED SLIPS.—Fig. 2.

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THE MANUFACTURE OF NEEDLES.

Needles are most usually made from steel, though the cheaper and coarser varieties are made of iron wire, which in the course of manufacture becomes converted into steel. The first operation is to wind the wire upon large reels or drums of from fifteen to eighteen feet in diameter. The large coil so obtained is next cut into two portions by means of pow-

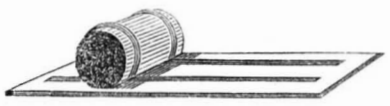
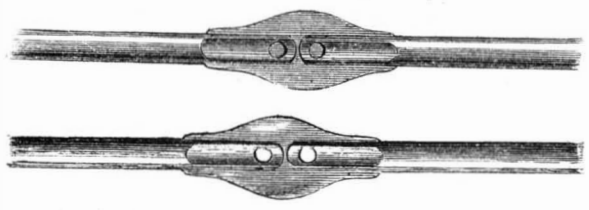


Fig. 1.—STRAIGHTENING THE NEEDLES.

erful shears, and these two bundles are further reduced by the same means and the use of a proper gauge, to pieces of double the length of the future needles. In this way one workman can produce in an hour 40,000 of these pieces, or shafts as they are technically called, equivalent to eighty



Figs. 2 and 3.—PUNCHING THE EYE.

thousand needles. This rate of production has been greatly exceeded by the introduction of automatic machinery.

The shafts now undergo a process of straightening, and to this end are gathered into bundles of five to six thousand pieces, upon which strong iron collars are slid. These bundles are slightly heated in order to soften the metal, and are then inserted between two plates of steel, the lower one of which is fixed while the upper

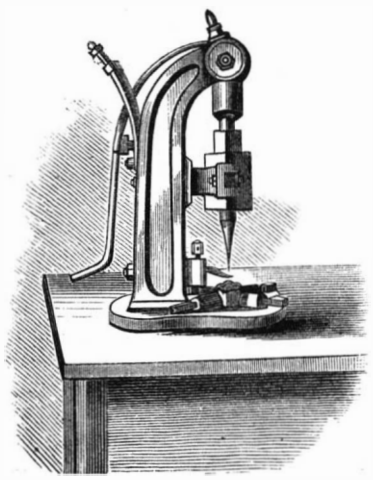


Fig. 4.—MACHINE FOR PI RCING THE EYE.

one is made to swing about an axis. These plates have longitudinal grooves for the reception of the iron collars so that the pressure is mainly and properly exerted upon the wires alone. The next operation consists in pointing the shafts at both ends. Grindstones of fine-grained sandstone are used with this view, rotating by means of belts with a velocity of about two thousand revolutions per minute. The workman, according to the fineness of the wire and the skill he possesses, takes one or two dozen or more shafts at a time and spreads them out upon the stone, giving them a slight rotary motion by means of his thumb and forefinger. In order to prevent the formation of rust the grindstone must be kept dry so that quite a quantity of stone and metal dust is produced, rendering the operation one not unattended with considerable danger to the health of the workman. After this sharpening operation the mode of procedure branches off into two different methods, the first and older one being to cut the shaft at this stage into components, while the one more recently brought forward continues the operations upon the double needles until very near the concluding steps. We will begin with the former method, being the one at present more extensively pursued.

The divided shafts, after leaving the shears as such, have their blunt ends flattened preparatory to the formation of the eye. This operation is conducted with great rapidity upon a small iron anvil. The workman takes a few dozen needles by their pointed ends, spreads them out fan-shape upon the anvil, and strikes several light and rapid blows with his hammer, flattening the heads of five or six at each blow. The ends, having been rendered too hard by this procedure for the following operation, have first to be heated and slowly cooled.

The eye is formed either by punching or piercing, never by drilling in the true sense of the word. In punching, the flat end of the needle is first placed upon a vertical steel point and struck with a hammer. Into the depression thus formed a steel punch is placed and the hole completed by another blow. A few taps about the punch then finishes the eye. The two stages of this operation are shown in Figs. 2 and 3. The delicacy of such manipulation, especially in the case of very fine needles, is really surprising and can scarcely be acquired by other than children, who attain an incredible degree of skill and rapidity. Their favorite trick of forming an eye in one end of a human hair and threading it with the other is no doubt familiar to all.

The idea of piercing the eye originated in England. The machine employed is shown in Fig. 4, and will be readily understood. A lever worked by hand lowers the steel point and drives it through the end of a needle placed properly beneath. The needles after receiving the eye have next to be provided with the groove serving to guide the thread to the hole. This is accomplished by means of a file which, at the same time, removes any burrs or other irregularities that may still be remaining.

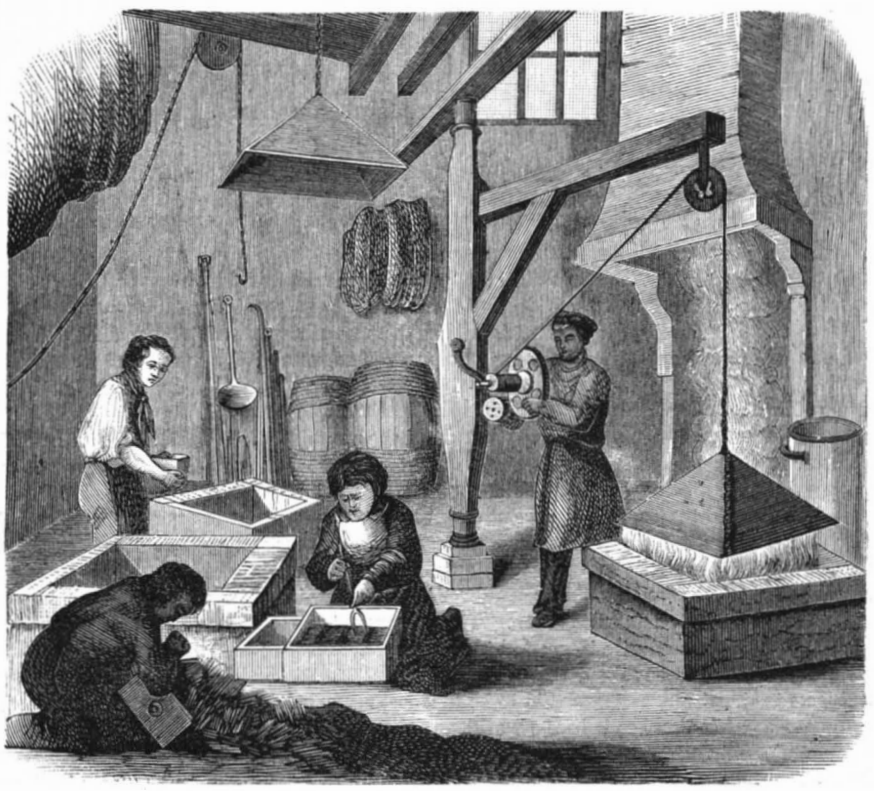


Fig. 6.—CEMENTING.

We will now go back a step in order to describe the second and improved mode of bringing the needles to the stage where we here stop.

The shafts, after being sharpened, are not divided as in the former instance, but are introduced whole, one by one, into a small stamping machine. They here are made to undergo the following changes by one stroke of the heavy die, both sides being acted upon at once. The central portion is flattened, the two longitudinal grooves in which the eyes are to lie are formed, together with a notch which is to assist later in separating the needles, and any numbers, letters, or other marks which the latter are to bear. Both eyes are formed at the same time by means of the piercing device shown in Fig. 5, after which the double needles are strung upon cords, and passed to a workman who files the whole string at once, breaks the shaft into two, and finally rounds their heads. Hardening of the needles made from steel wire then follows, the iron ones being converted into steel by means of the process of cementation (Fig. 6).

The next stage of the manufacture—scouring and polishing—is about the most tedious and troublesome of all, though several millions of needles are worked upon at once. The needles are arranged in parallel layers upon pieces of coarse, strong cloth, mixed with sharp sand or emery, moistened with oil, usually linseed, and, after the mass is sufficiently large, rolled up into bundles of about eighteen inches in length by four in diameter. Twenty or thirty of these bundles, each containing about half a million of needles, are placed in a scouring mill and rolled back and forth under heavy pressure for about twelve to eighteen hours. The filthy looking mass is then removed from the bundles and stirred about in a large drum full of sawdust, which removes the oil, dirt, and sand, and leaves the needles already pretty bright. These are then separated from any adhering sawdust by means of an air-blast, and are again submitted to the scouring operation. This is repeated for about ten times, finer grades of sand and emery, binoxide of tin, rouge, or bran being successively used. After this the needles undergo a thorough washing in warm soap water, and are dried in sawdust, which completes the cleansing process.

The common cheap varieties are then hastily gone over again with a piece of cloth or soft leather, after which the broken and otherwise defective ones are removed and the rest properly assorted and arranged. The better classes of needles undergo various additional manipulations. To begin with, their points are gone over again more carefully, the rough treatment in the scouring mill being very apt to render them blunt. They are held about twenty-five at a time against a cylindrical or prismatic grindstone (Fig. 7), at the same time being slowly rotated between the fingers. In order to prevent the fraying or cutting of the thread against the possibly rough edge of the eye, these latter are gone over again with a rapidly rotating fine steel drill. This operation is shown in Figs. 8 and 9, the latter giving a clearer view of the mechanism employed.

Fig. 7.—RE-SHARPENING.

England and Germany are the two principal countries engaged in the needle manufacture. Redditch is the needle-producing center in England, and enjoys in its own special branch of manufacture as high a reputation as do Sheffield and Manchester in theirs. The largest factories in Germany are situated at Ichtershausen, in Thuringia, and at Aix-la-Chapelle, and

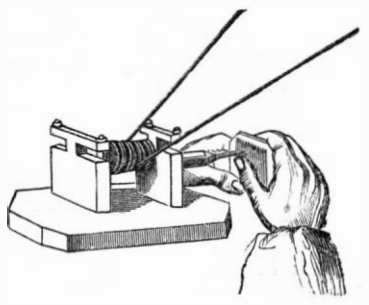


Fig. 8.—DRILLING.

turn out, in the course of a year, respectively about three hundred and fifty millions and one hundred and fifty millions of needles of all grades.

The earliest needles were "square eyed," that shape being the most readily produced. Drill eyed needles, after many unsuccessful attempts, were first brought out in 1826. The burnishing machine, in which the needles are on a steel wire to which rapid revolution is imparted, was introduced two years later. By this, a beautiful finish is imparted to the eye. The process of hardening them in oil was introduced in 1840, water having been previously used for this purpose, which caused a large proportion of them to become crooked, requiring the services of a large number of workmen to straighten them. These being thrown

Fig. 5.—PIERCING THE EYES.

Fig. 9.—THE DRILL BENCH.

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out of employment by the introduction of the new process made a riot, and drove its introducer out of town; but it was generally adopted. A similar disturbance had taken place in 1830, on the introduction of the stamping machine. The machine for pointing is of still more recent introduction.

Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

The following appeared in the *Star* of this city:

A board appointed by Secretary Schurz, consisting of Z. F. Wilbur, examiner of interferences in the Patent Office; N. S. Howe, of Assistant Attorney General Marble's office; and J. A. Armstrong, chief of the private land claim division of the General Land Office, met to-day to inquire into the truth of the charges preferred by Mr. Doolittle, Assistant Commissioner of Patents, against J. McClary Perkins, a patent attorney of this city. The charges allege malpractice and irregularity on the part of McC. P. When the board have finished their investigation they will report to the Secretary, with their recommendations.

This is the same J. McClary Perkins that reported that he had preferred charges against the Commissioner some time ago.

Among the patents recently issued, I notice several to Mr. Holly, of waterwork fame, for his system of warming a city by steam, supplied as gas and water is now through a series of mains. The idea of distributing hot air and steam for heating buildings, etc., from a number of heaters or boilers in a central location has been a favorite idea of many inventors, and some have proposed the distribution of cooled air in the same way, one at least of which proposed to erect a tall tower to draw down from the upper regions cool and pure air. Mr. Holly, therefore, is not the first worker in this field, and all that he can cover is his peculiar arrangements, which, it must be confessed, are very comprehensive, as they include, besides heating buildings, furnishing steam for driving machinery, operating steam fire engines by connecting them direct to the mains, protecting hydrants from freezing, freeing the streets from snow and ice, heating greenhouses, supplying steam and hot water for culinary purposes, etc.

One of the members of the Virginia Legislature, having invented a register, succeeded at the last session of that body in getting a law passed to compel every barkeeper to purchase one of his instruments to record every drink sold, and on every drink thus registered the landlord was to pay a tax to the State. This, of course, caused considerable excitement among the dealers in the "ardent," and they no sooner became aware of the law than they set about finding some means to evade it. Having learnt that the Moffett liquor register had been rejected in the Patent Office, they bought up the patent that formed the basis of the rejection and engaged Messrs. Hill & Ellsworth, of this city, to bring suit against the manufacturer of the Moffett register, which was done, and an order has been issued by Judge Hughes, at Norfolk, restraining the issue of the registers until the question as to a preliminary injunction can be argued.

General Le Duc, the new Commissioner of Agriculture, has instituted a series of inquiries from which he expects to procure such information as will enable him to prepare a plan of operations that will very much increase the economic value of the department under his charge. The department has been of little real use so far, as very little has been accomplished beyond the collection of statistics regarding crops and the ravages of insects, which, though in themselves valuable to the commercial and agricultural interests of the community, are not all that the country has a right to expect from the operations of the department. General Le Duc proposes, among other things, to establish a comprehensive system of inquiry into the physical characteristics of the various sections of the country, with a view to the propagation of various products thought to be adapted to certain localities, but as yet have not been cultivated there, and also intends to stimulate, as far as practicable through the agency of the department, the cultivation of those agricultural productions for which we have now to send to foreign countries. The reports so far received show that the climate and soil of the Pacific coast are apparently very well suited to the cultivation of teas, which he thinks could be made an important industry, especially in view of the number of Chinese already on that coast, and the ease with which more could be had if found desirable. Sugar, also, though now largely cultivated in the South, it is believed could be made a much larger item in our annual production, if properly tried in other suitable regions. In view of this proposed action, the Commissioner recently addressed letters to prominent senators and representatives, asking them to furnish the department with all information in their power as to the character and diversity of the crops in their sections, the kind of soil and climate, and any other data that they might consider of interest on the subject; and also requesting them to furnish the names of such leading farmers as would be likely to receive and experiment with such seeds and plants as might be sent to them from time to time.

The Bureau of Statistics having now received full returns from all the customs districts, of the exports and imports during the last fiscal year, furnishes the following corrected statement: Total exports (specie values) $602,474,581; total imports, $451,307,549—showing an excess of imports over exports of $151,167, 032. In the fiscal year 1876, the excess of exports over imports was $79,463,481. In the fiscal year 1877, the exports of coin and bullion amounted to $56,163,237, and the imports to $40,774,414, while in the preceding year the exports were $56,606,305, and the imports only $15,936,681.

It is reported that the Post Office authorities here have serious apprehensions of a general strike of the engineers and firemen of the various roads throughout the country, which it is thought will begin towards the close of the present month, or the beginning of next. The information is said to come from reliable sources; and it is feared that great inconvenience in all the departments of business, and especially in the postal service, will be caused by it. *Per contra*, Chief Arthur of the Brotherhood of Locomotive Engineers positively contradicts these rumors and says that his society is at present on amicable terms with the railroad companies, and that in the event of a future disagreement the brotherhood will not resort to a strike until all other efforts at a settlement have failed.

Mr. O'Sullivan, who has been prominent in the Nicaragua Canal scheme, has been at the State Department on diplomatic business connected with that enterprise. He says that the work will cost about $80,000,000, and can be completed within five years. It is said that no appropriation is to be asked of Congress, but subscriptions are to be opened in all the money markets of the world. He speaks confidently of the success of the work, the surveys of which have been made by United States officers.

Since the first of July the Secretary of the Navy has given employment to 3,400 men at the different navy yards throughout the country. The appropriations for the several bureaus of the departments, although smaller than usual, have been liberally distributed so as to give employment to as many men as possible; and that it may be made to go as far as practicable, the wages paid per day to each man have been reduced to some extent, so that the more men may be employed.

There has been more activity in the Navy Yard in this city during the past month than for many years, except for a short time during the Cuban trouble.

Captain Howgate of the Polar expedition has returned from New London, where he has been superintending the sailing of the Florence for the Arctic seas. He is well pleased with the success that has so far attended his enterprise and will not let the grass grow under his feet, but, it is said, will immediately urge all the members of Congress that he can reach to aid him by passing the bill which was presented to the last Congress, making an appropriation to aid him in his exploration. He does not, however, intend to rely wholly upon the rather uncertain favors of Congress, but hopes to take such steps that, in case it refuses him any aid, he will still be able to leave in August, 1878, with the second and most important part of the expedition.

There are imprisoned in Fort Marion at St. Augustine, Fla., some seventy Indians, and Clark Mills the sculptor, of this city, has been sent down by the Government to take casts of the more prominent among them. Some anxiety was felt as to the success of the operation, as it was quite uncertain how the Indians would relish the operations incident to having their casts taken. They, however, made no trouble, and were quite interested in the matter, allowing sixty-two casts to be taken, which are to be given to the Smithsonian Institute, and are said to be the most remarkable collection of Indian heads in the world.

Washington, D. C. OCCASIONAL.

A Question of Axial Change of the Earth.

To the Editor of the Scientific American:

Granting the axial motion of the earth to have been communicated by the sun, at the time it was thrown off from the sun: First, does it necessarily follow that the present axis is the same as at the time the earth took position in its orbit after severance from the sun? Second, would not the destruction of individual fixed stars and planetary bodies by combustion or disruption change the position of the earth relative to our solar center, affect its orbital motion, and change its original axis? Third, if the axis of the earth has changed, or its obliquity to the plane of its orbit has changed, from any cause within or outside our solar system, could not the glacial drift be imputed to this cause as necessarily producing climatic disturbances resulting in the conversion of the frigid to the torrid zone, and *vice versa?*

Nashville, Tenn. JOSEPH PHILIPS.

Leaks in Gas Pipes.

To the Editor of the Scientific American:

It sometimes happens in fitting gas pipes, no matter how careful or cautious the workman has been, small leaks will occur. Any one who had the mercury go down on him, after he has used every endeavor, made every precaution against leaks, knows how exceedingly annoying it is. It often takes nearly as much time to locate the leaks and stop them as it does to do the work previously done.

If gas fitters will act on the following hints, which is my plan, they will save themselves a large amount of unnecessary labor. I am going on the idea of a job worth doing at all is worth doing well. I have no patience with botches, or workmen whose highest ambition is to deceive the inspectors, or those who will do a job and leave without being able to tell truthfully whether their work is tight or not.

In getting out pipe, I notice each length and see that it is perfect. It sometimes gets damaged in transportation. In screwing on the fittings, see that they are cemented inside and out. Have the pipe just warm enough to melt the cement. Have the fitting as hot as it can be without burning the cement. Screw together tight, and when cold the fitting, by reason of its greater heat, will contract more in proportion than the pipe. You will not lose much time by this extra care, and certainly no reputation.

If, after all your pains, a leak is indicated by the gauge, you may be sure it is a very small one, or, as for that matter, the rapidity of the mercury's descent will indicate the character of the leak.

If it is small, and you are pushed with other work, it may be stopped effectually by screwing a short piece of inch pipe, with a cap on one end, to the bottom of the receiving main, having previously poured into it some commercial hydrochloric acid—a half pint or thereabouts—with a handful of zinc scraps. A chemical action sets up between acid and zinc, liberating gas that soon rusts the leak tight. What might be termed large leaks can be stopped in this way. I have reference to new pipe. Whether this will stop leaks in old pipes or not I am unable to say.

Frankfort, Ky. M. A. JONES.

oison Ivy and its Remedies.

To the Editor of the Scientific American:

Poison ivy, poison oak, mercury vine, *rhus toxicodendron;* climbing ivy, *rhus radicans;* poison sumach, poison elder, dog elder, poison dogwood, *rhus venenata.*

The milky juices of these shrubs are neutralized and made harmless by almost any alkali. Strong suds made from soft or potash soap, white lye, ammonia water—four or five teaspoonfuls to a pint of common water—or a little saleratus dissolved in water, make good washes for the purpose. These washes may be used as preventives and as remedies.

White lye is made by throwing a couple of quarts of the ashes of hard wood—hickory, oak, or any other hard wood—into a pail of water. Stir and let settle. The clear liquor is white lye, and is a good wash.

First, as preventives—when one is going, or thinks he is going, to be exposed to the influence of these plants—wet every part of the skin that is exposed or uncovered with one of these washes, and be sure to let the wash dry on the skin, by no means wiping it off. This treatment protects the skin from the influences of these poisonous plants.

It must be kept in mind that these shrubs, especially when crushed or cut, have the power of affecting some skins even at the distance of several feet. After one has been exposed, or fears he has, let him follow the same directions, being careful to let the wash dry on the skin.

If, by the swelling and reddening of the skin, by the heat and itching and stinging, one finds that he unawares has been "poisoned," use these washes freely on the inflamed parts, only let them dry on the skin. Keep cool and quiet, restrict oneself to a spare and cooling diet, and keep the bowels gently open.

If much of the skin is involved in the inflammation, some caution may be needed in applying the washes. I once knew a case where the inflammation left the skin—on the hands and face it was—and settled on the lungs. For a few hours it seemed as though every gasp of the patient would be his last. A large and very strong mustard poultice on the chest at last brought the poison all out of there. But it left on the lungs a cough that lasted for months.

Ithaca, N. Y. W. M. KINNE.

Another Remedy for Poison Ivy.

To the Editor of the Scientific American:

I have a remedy which I have used for several years with success. It is one half ounce of salts of tartar dissolved in two ounces of water, and applied to the affected parts several times daily.

Branford, Conn. R. O. SMITH.

Laboratory Conveniences.

To the Editor of the Scientific American:

Little laboratory experiences, the knowledge of which saves much annoyance and contributes greatly to the pleasure of working, are naturally overlooked by the inexperienced. The repetition here of some of them may be of benefit.

A piece of wire gauze soldered over the escape in a sink will prevent the pipes becoming clogged.

To clean greasy utensils, some pieces of newspaper, a soaped sponge, and a little powdered pumice does the work in a twinkling; whereas many will thoughtlessly and laboriously try the effect of soap and water alone. Profanity is known to have been occasioned by a hard water complication.

Bits of paper, with or without muriatic acid, are nearly always preferable to shot for cleaning bottles, of course when there is no thick sediment.

A wet cloth, on which the glass receptacle of a hot liquid is set, will, in some way I am unable to explain, obviate breakage.

A rubber band to keep the cloth used in straining from the sides of a funnel is a convenience. F. E.

Belleville, Ill.

A Peculiar Appearance in Aniline Red.

To the Editor of the Scientific American:

A few evenings ago I put a small quantity of aniline red in a jar of water, to notice the minute division of matter. A lamp stood on one side of the jar. After the liquid had been stirred up and stood a while, I observed little specks of the aniline floating on the top, with what resembled little tails projecting in the opposite direction from the lamp, and as the specks appeared to have no motion I thought this rather peculiar. I changed the lamp to the opposite side of the

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jar, and found that after a short time the tails changed also. I thought the appearance bore a striking analogy to the tail of a comet. Will some one give an explanation of the phenomenon.

Albany, N. Y. W. J. WATSON.

The Largest Saurian.

Professor O. C. Marsh has recently received a collection of reptilian remains from the crustaceous deposits of Colorado, among which he has found portions of an enormous dinosaur which he states is larger than any land animal hitherto discovered. The dinosaurs were a tribe of immense saurians, having many mammalian characters, such as a medullary cavity in the long bones, short pachyderm-like feet, a sacrum of five united vertebræ, and a lateral motion of the lower jaw. They include the iguanodon, megalosaurus, etc., herbivorous and carnivorous. The alligator belongs to the same order. The reptile discovered by Professor Marsh probably measured from 50 to 60 feet in length. It was herbivorous and seems quite distinct from any species hitherto described. The name *Titanosaurus montanus* has been applied to it.

Preservation of Telegraph Poles.

M. Tiveyrat proposes to protect the portions of telegraph poles which are buried in the earth by sleeves of galvanized iron about 0·4 inch in thickness, covered with tar or red lead. The sleeves are imbedded in the wood of the post and extend somewhat above the ground. Tar is applied to the upper joint so that no water can enter between the sleeve and the wood, and the lower part of the former is bent over the bottom of the post and covered with an iron cap.

HOW TO RE-BORE THE ENDS OF STEAM CYLINDERS.

A correspondent asks: The wear of the bore of my 16 inch engine cylinder has left a projecting ridge all round the bore of the cylinder at each end. Having no boring apparatus, how can I remove the ridges?

Take a bar of steel about $\frac{9}{16}$ inch square and three feet six inches long; forge it at one end to the shape shown in Fig. 1.

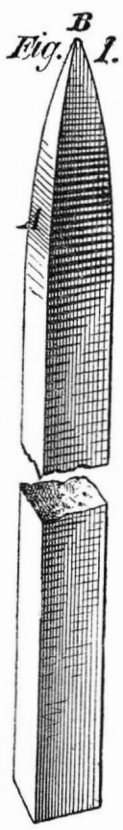

Fig. 1.

in which from A to B is the forged end. This end must then be heated along its entire length to a cherry red, and dipped vertically into cold water to harden it; after which it must be ground from A to B on all four faces square across, and as nearly of an even curve as can be ascertained by the eye. Next take a piece of hard wood—oak for instance—about an inch thick and three inches wide, cut it to such a length that when placed upright its ends will wedge tightly into the counterbore of the cylinder. Into the edges of this piece of wood saw out a series of notches, making its finished appearance to be such as shown in Fig. 2. The object of fitting its length tightly into the counterbore of the cylinder is as follows: If both cylinder covers are off or can be conveniently taken off, the ridge can be operated upon at each end of the cylinder; hence our piece of wood—which is merely an improvised rest to act as a fulcrum for the bar scraper shown in Fig. 1—would require to fit into the counterbore. If, however, only one cylinder cover can be conveniently taken off, the piece of wood will require to fit in the counterbore at the open end and in the cylinder bore at the closed end of the cylinder, hence we make it large enough for the counterbore, and after having removed the ridge at that end we cut the length of the wood down to fit the cylinder bore, whereas if we made our rest to fit the bore at first, we should require to use wedges to make it fit the counterbore. In some cases holes might be bored near the ends of the rest or fulcrum to serve the same purpose as the notches. The method of using the scraper, Fig. 1, is shown in Fig. 3, which represents an engine cylinder. B is the wooden rest or fulcrum; C, the lever scraper operating on the ridge at the closed end of the cylinder. The lever, C, is worked on the pulling stroke only, and is so held that the edge presents a keen scraping tool which will cut very freely. The fulcrum, B, should be adjusted as closely as convenient to the work, so as to obtain good leverage for the scraper. It should be moved in its position so that during the roughing out only the lower notches in the fulcrum are used.

Fig. 2.

A plan was lately resorted to on the White Star line of steamships for re boring a cylinder. The cylinder heads and piston follower were taken off; a groove was cut from the outer end of the cylinder along the bore as far and as deep as the counterboring was required to be done. The counterboring was then accomplished in the manner shown in Figs.

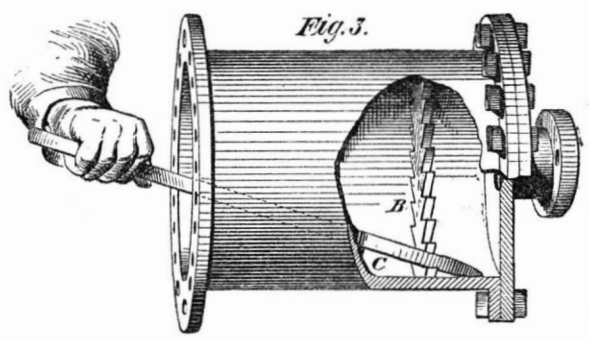

Fig. 3.

4 and 5. The junk ring was provided with a small tool holder, such as is used upon boring bars. The tool was fastened in the holder while its cutting edge was in the groove referred to, cut as deep and as far up the cylinder as the counterboring was to be. To the junk ring was fastened,

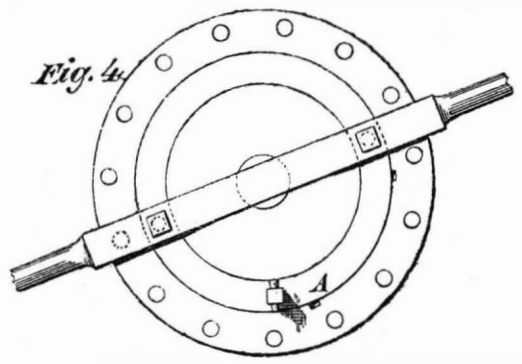

Fig. 4.

by two long bolts, a wooden lever extending above and across the cylinder. Two men walked around pushing the lever, and when the tool at each revolution arrived at the groove, a fresh cut was taken by moving the engine so as to raise the piston the necessary amount. It is obvious that the piston head may be steadied and held true in the bore of

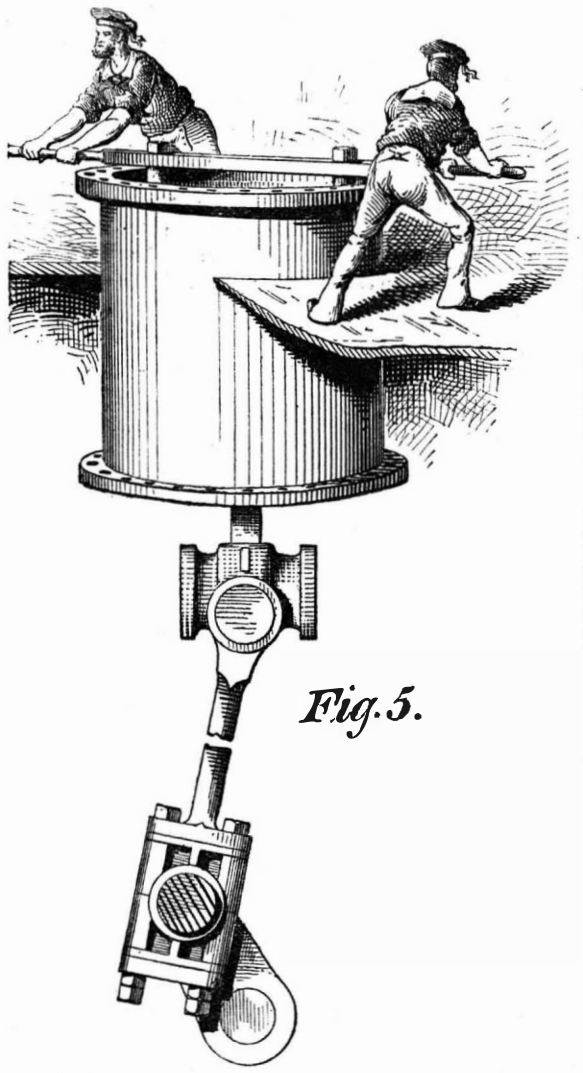
Fig. 5.

the cylinder by means of a few wooden wedges. Thus we see that in this operation the junk ring was made to serve as a boring bar head, the men furnishing the necessary rotative motion, the feed motion to the tool being obtained by advancing the piston toward the end of the cylinder where the work was being done.

Testing for Salicylic Acid.

This is best done either in wine or urine, says M. Harty, by Yvon's process. The liquid, to which is added a few drops of hydrochloric acid, is agitated with a little ether. The ether combines with the salicylic acid and abandons it, by spontaneous evaporation above a weak solution of perchloride of iron, producing a strongly colored violet ring.

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

Positions of Planets for September, 1877.

Mercury.

On September 1 Mercury rises at 7h. 53m. A.M., and sets at 7h. 18m. P.M. On September 31, Mercury rises at 5h. 34m. A.M., and sets at 5h. 24m. P.M.

Venus.

Venus is in south declination, but may be seen for a little while after sunset. On September 1, Venus rises at 8h. 9m. A.M., and sets at 7h. 43m. P.M. On the 30th, Venus rises at 9h. 17m. A.M., and sets at 7h. 7m. P.M.

Mars.

On September 1, Mars rises at 7h. 10m. P.M., and sets at 5h. 44m. A.M. of the next day. On September 30, Mars rises at 4h. 54m. P.M., and sets at 3h. 22m. of the next morning.

The motion of Mars, which has been retrograde or westward among the stars, is becoming less so, and will scarcely be perceived during the latter part of the month.

Astronomers are interested in making observations on the change of place between Mars and the stars near it, in order to determine the distance of Mars and that of the sun. The observations will be made at night and at morning, when Mars is in the east and when it is in the west. Mars is in its best position early in September.

Jupiter.

On September 1, Jupiter rises at 2h. 19m. P.M., and sets at 11h. 19m. P.M. On the 30th, Jupiter rises at 0h. 35m. P.M., and sets at 9h. 35m. P.M.

Jupiter sets so early in September that observations upon it must begin as soon as twilight is over. If we take the hours from 7 P.M. to 9 P.M., Jupiter may be seen without its 1st satellite, on the 5th, 11th, 19th, 20th, 27th and 28th of September. Jupiter may also be seen between 7 and 9 P.M. with only three satellites, the smallest being invisible, on the 1st, 10th, 17th and 19th of September. Jupiter will be seen without the largest satellite on the 13th and 24th, and without the 4th on September 22.

When, with an ordinary telescope, these moons cannot be found, they are hidden by Jupiter, or they pass into the shadow of Jupiter, as our moon passes into the earth's shadow in an eclipse, or they come between us and Jupiter, and they are lost in the stronger light of the planet.

Saturn.

Saturn and Mars continue to rise at nearly the same time throughout the month of September. In the early part of the month Saturn rises before Mars, but will not be so readily seen, as its apparent size is less and it is a pale yellow in color. As soon as Mars is well up above the horizon, Saturn can be found from 4° to 5° further north than Mars.

These two planets will be in their best position early in September, and will be very brilliant near midnight. Jupiter, Saturn and Mars can be seen from about 7 P.M. to 9.30 P.M. in September.

Uranus.

Uranus makes its diurnal path so nearly with the sun that it cannot be seen except for a few hours in the early morning. On September 30, Uranus rises at 2h. 35m. A.M., about one third of a degree north of Regulus.

Neptune.

Neptune rises on September 1 at 8h. 51m. P.M., and sets at 10h. 20m. A.M. of the next day. On September 30, Neptune rises at 6h. 56m. P.M., and sets at 8h. 24m. A.M. of the next day.

A Good Word for the Crow.

Let me speak for the crow. Last year as I was harrowing corn with a vibrating harrow having teeth (you know it is a noisy thing), it uncovered a great number of white grubs, which you could see all about the ground. They are very destructive to vegetation of all kinds. They ate or destroyed thousands of hills of corn that year. You could see the track of the grubs as they traveled to get something to eat, for they travel when in search of food. You could see the surface of the ground a little elevated, and checked when the surface is hard and dry. Well, you see, when I was harrowing, as soon as the crows heard the harrow at work, they would come and light on the ground that was being harrowed, and the fresher the better they liked it; when going one way they would light after I had passed along; when I returned, and came within six or eight rods of them, they would rise gently and circle around in the rear again. I have counted as many as seventeen grubs that one crow has picked up at one lighting. They take any and everything, large and small—that is, worms, grubs, and beetles. Crows can't pull corn when planted with a machine; we have no fear of them from that source. Finally, wherever civilization is, there are rooks and crows.—*Letter to Chautauqua (N. Y.) Farmer.*

Indoline.

This name has been given by M. Schutzenberger to a new derivative of indigotine. It has the formula $C_{16}H_{14}N_2$. It dissolves by heat in dilute hydrochloric acid and sublimates in needles in concentrated sulphuric acid.

Influence of Light on Bacteria.

Arthur Downes and T. B. Blunt announce as a new result in their investigations, that light is inimical to the development of bacteria, and under favorable conditions may prevent their development.

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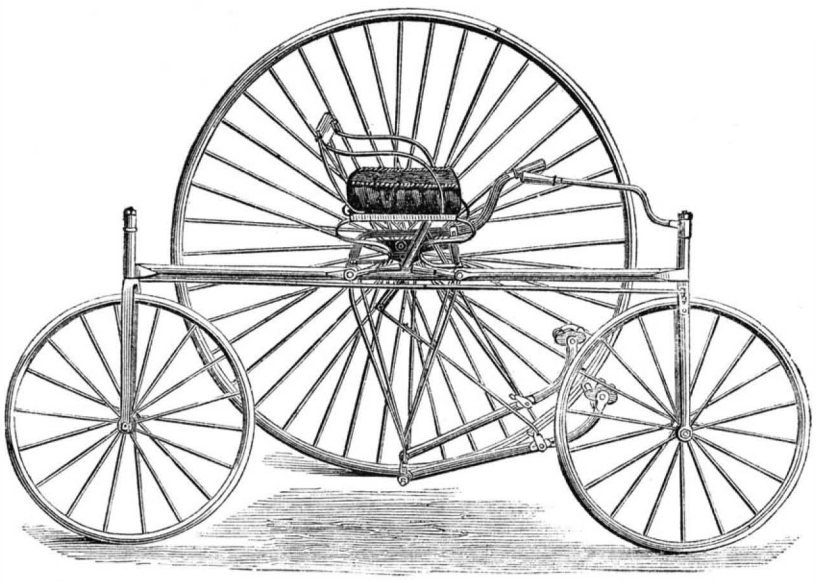
THE COVENTRY TRICYCLE.

The tricycle, as it is designated, shown in the accompanying engravings, consists of a rectangular frame made of iron or steel tube, which carries a double cranked shaft in patent parallel bearings. The driving wheel, 42 inches in diameter, is arranged on a left hand side of the rider; and the other side of the rectangular frame is produced, front and back, for carrying the forks of two 22-inch steering wheels. These forks are connected by a rod, fixed to the outside of of one and the inside of the other, so that both wheels are turned together by the steering handle. The effect of this arrangement is that the rider is enabled to thread his way between other vehicles with the greatest ease; and it is even said that he can describe a figure 8 in a length of 12 feet. The seat is mounted on four steel springs of S form, which



THE COVENTRY TRICYCLE.—Fig. 1.

are attached to the frame by nuts on the screwed ends of the stays carrying the pin on which the pedals work. Rods jointed to the pedals turn the crank shaft, as will be seen in the engraving, Fig. 1. The second handle is merely to afford support for the left hand while the right is occupied in steering.

Fig. 2.

The tricycle is fitted with tangent wheels, in which, as will be seen in Fig. 2, the spokes are crossed, and each spoke locks the other. By this arrangement greater lightness can be obtained for a given strength; and another great advantage is that in the event of a spoke being broken, another can be replaced by the rider in a few minutes. The machine can be readily taken to pieces and packed in small compass.

IMPROVED MINING ENGINE.

We reproduce from *Iron* the engraving and description of an engine called the Tuxford Mining Engine, which has been erected for the Votty and Bowydd Slate Company, Festiniog, North Wales.

The fire box rests upon a cast iron ash pan, while the smoke box end of the boiler is supported on a crutch, forming a feed tank and heater. The crank shaft is geared to the drum, from which is worked the spear rod attached to the bell crank of the pumps.

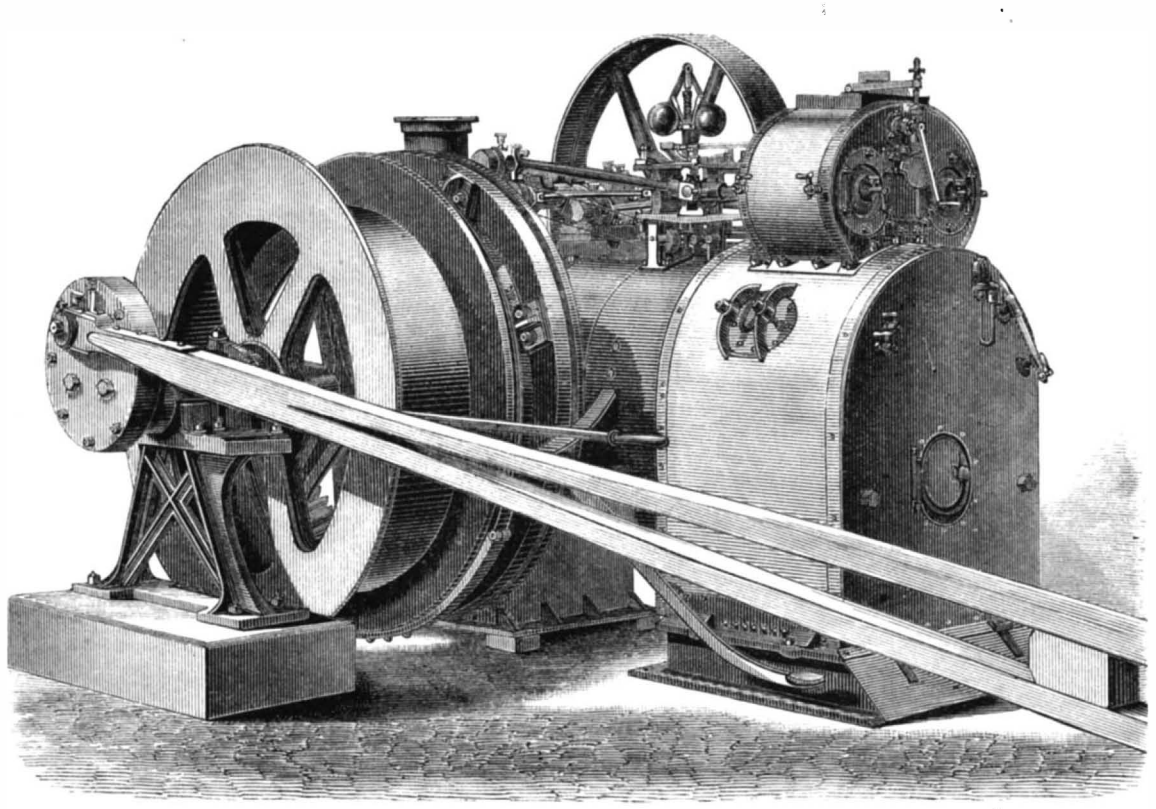
In all the Tuxford engines, great attention is paid to economy of fuel; and it may be said that the proportions of the boilers differ from those adopted by any other maker. The fire box has an unusually large surface, but the grate area is reduced by fire logs mitred at the corners; the tube surface is unusually small; indeed, the tubes are only six feet long. The effect of this is to make the boiler remarkably short and compact; and it will be interesting to state the reason why these proportions have been adopted.

About ten years ago Mr. Tuxford was led to make some experiments with boilers to ascertain the relative value of great area and tube surface, and of long as compared with short tubes. He had a model boiler of the horizontal type constructed with three tubes, and divided vertically into three compartments; on trying the temperatures of these compartments with the thermometer, he found that steam of high temperature, and therefore pressure, was generated in the compartment nearest the fire; that in the middle compartment a less degree of heat was obtained, while in the compartment the furthest from the fire the temperature was below the boiling point. This showed that by the time the gases reached the end furthest from the furnace they became cooled down to a lower temperature than the steam generated at the end of the nearest furnace; and therefore exerted a condensing influence on the steam already generated, thereby causing a tendency to prime, in addition to the direct loss of heat. The result of these experiments was that the form of boiler described above was adopted as the type of all those constructed in future by the firm.

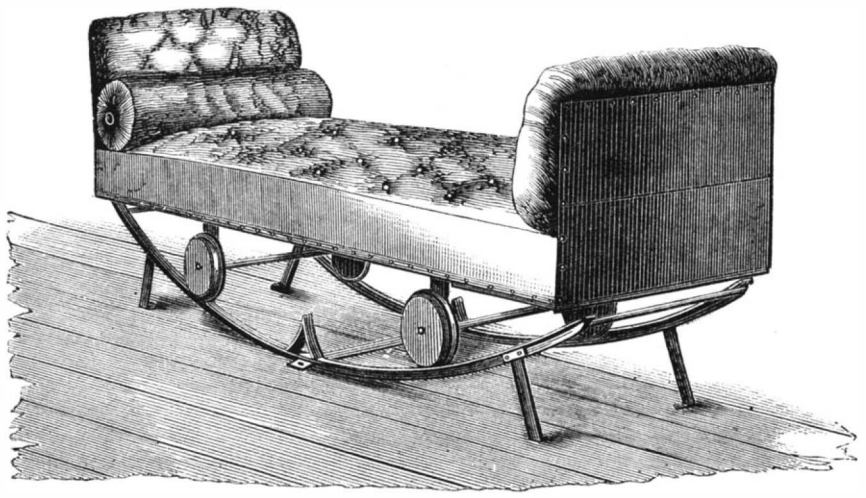
All radiation of steam from the cylinders is effectually prevented by an ample steam jacket, which also takes the place of a dome, carrying the safety valve, the heating, and regulator valve. In this way the steam enters the cylinders at boiler pressure by a short and direct passage, instead of by a long, tortuous pipe, which is apt to throttle the steam as well as reduce the pressure, owing to radiation. The pistons have two cast iron rings, each divided into three segments, so that the wear on the inside of the cylinder is perfectly uniform. These segments are arranged outside a circular steel spring, being held in position by tongues fixed by means of studs and back plates. At the back of the ordinary slide-valve works the expansion valve, consisting of two iron plates; the sheave of its eccentric may be shifted on the main shaft to any angle, so as to cut off the steam at any desired point in the stroke. The rods are supported in bearings fitted to the governor bracket, so that the glands of the stuffing boxes are relieved of all weight, and only have to perform their legitimate office of keeping a steam-tight joint. A Watt governor, with a spiral spring to quicken the fall of the balls, acts directly on the throttle valve; but its effect on the speed of the engine may be regulated according to the work in hand. The fork is provided with a stud, which may be adjusted on a small slotted quadrant attached to the throttle valve spindle, so as to regulate the opening of the latter by the action of the governor balls. By means of a regulating valve, any portion of the exhaust steam may be turned into the feed tank with the surplus water from the pump; in this way the feed water may be raised to boiling point before being forced into the boiler. The mud plugs are screwed into the boiler, and have an external screw for receiving the cap, so that there is no internal thread to be stripped off by the tool used for clearing out the mud.

The crank shaft has a spur pinion keyed on its end, which works into an internal or annular spur wheel keyed on the drum shaft, in the proportion of 1 to 9. The drum runs loose on its shaft for lowering, until connected by a sliding clutch for raising the cage; the barrel is of wrought iron, but it has cast iron flanges, with a rim for the brake to act upon. On the end of the drum shaft is keyed an eccentric crank disk for working the spear rod; it is provided with a slot in which the pin is adjustable, so as to give a longer or a shorter stroke to the pumps, as may be required.

The starting lever of the engine, the striking lever of the clutch, and the foot plate of the lever acting on the brake, are all within reach of the driver, and his position enables him to see the pit mouth, so that overwinding is almost an impossibility. This arrangement is, in fact, the great feature of the engine.



THE TUXFORD MINING ENGINE.



ANDERSON'S EQUILIBRIO COUCH.

ANDERSON'S EQUILIBRIO COUCH.

This couch is designed for use in passenger ships, to counteract the rolling motion, and so provide for its occupant a means of exemption from the principal cause of sea sickness. Its dimensions are similar in all respects to those of an ordinary couch. Any number may be placed together, end to end, when they will act in unison, and occupy very little more space than is required for ordinary couches.

The couch is provided with two pairs of flanged wheels, with india rubber tires running upon concave rails, attached to any suitable frame, and forming arcs of a circle, of which the length of the couch may be the radius, and consisting of as many degrees on either side of the center as it is desired to counteract; it is thus caused to maintain its own level by the influence of gravity, and when placed transversely across the ship, remains horizontal while the latter is rolling.

The extent to which the motion of the ship may be thus neutralized is only limited by the length given to the concave rails, a very slight extension of which—in the ratio of about an inch to a degree—will considerably increase the counteracting action. The rails in our illustration do not exceed the length of the couch itself, but the couch will nevertheless counteract 15 degrees of rolling each way, or 30 degrees in all, and will therefore allow of its free action in either direction while the ship may be rolling to that extent. The india rubber tires on the wheels render the motion and the checking of the couch easy and noiseless. —*The Engineer*.

Telegraph Wires Melted by Lightning.

A very severe thunderstorm passed over London on the evening of July 5. Between eight and nine there came a very brilliant flash of lightning, followed by a deafening peal of thunder. Many people were stunned, and in several cases were found quite insensible. Immediately after it was found at Kilburn that the telegraph wires, running from the top of the Queen's Arms to a house about 300 yards higher up the Edgeware Road, were struck by the lightning, and fell in red-hot fragments, varying in length from six inches to an inch, all along the road, a great deal of yellow smoke attending the fall of the wire. This shows that ordinary telegraph wires are not probably large enough to carry heavy strokes of lightning with safety.

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SNOWY-LIPPED LADY'S SLIPPER.

The annexed illustration represents a pretty little plant which was exhibited in May last at the South Kensington (England) Flower Show. This graceful little species of the

hardy lady slipper attains 10 inches or 12 inches in height, and generally bears a couple of flowers at the top of its leafy stems. In general habit, size, and form of its flowers, it closely resembles *c. calceolus*, but is readily distinguished from all other hardy cypripediums by its egg-shaped lip being of a pure white color. It is undoubtedly a desirable plant. Lindley describes a similar plant under the name of *c. cordigerum* as being found scattered through Europe, Dahuria, and, according to Thunberg, also in Japan, adding that its characters are those of our native *c. calceolus*, except that the lip is pure white. For a long time neither cultivators nor botanists recognized the vagaries in size, form, and color, which are now apparent in tropical and epiphytal orchids; and the immense variety observable in the hardy, exotic, terrestrial species is just beginning to be apparent. That the hardy lady slippers, however, do vary quite as much as their tropical congeners was shown in a luxuriant batch of the rosy-lipped *c. acaule* (*c. humile*) recently exhibited, among which we noted three forms so distinct in size and color of the flower and in breadth of the leaf that only a few years ago they would undoubtedly have been described as new species.

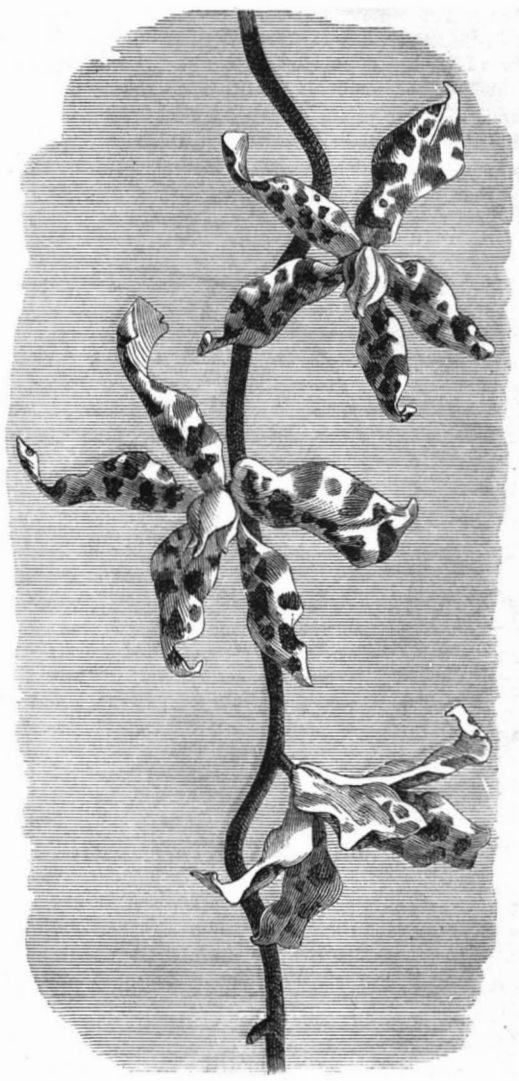
Longest Tunnel in America.

Few people know how great an engineering enterprise is going on in Baltimore county. For one thing alone, a tunnel six and four fifths miles long—36,510 feet—is being built underground, for over four fifths of the distance through hard gneiss and granite. It will be the longest tunnel in the country, and there will be only two larger in the world—the Mont Cenis, which is eight miles in length, and the St. Gothard, now in progress of construction, and which is to be nine and one quarter miles. The fact that the water supply tunnel lies near enough to the surface to allow of numerous shafts greatly facilitates its construction. The tunnel is a circle 12 feet in diameter, and extends from the Gunpowder river, about eight miles from the city, to Lake Montebello —the distributing reservoir—near the Hartford turnpike, about one mile and a half from the city, the direction being 26° west of south. This tunnel will conduct the water from the Gunpowder river to Lake Montebello. Thence a conduit, 4,120 feet long, known as the Clifton Tunnel, from the fact that it passes under a portion of the Clifton Park, conducts the water to a point just south of the Hartford road, where it enters six mains, each 4 feet in diameter, which convey the water to the city, a distance of 1,900 feet. The country along the line of the works is hilly, and the tunnel varies in depth below the surface from 67 to 353 feet. There are 15 shafts in the main tunnel, the deepest extending 294 feet below the surface. The water rains down from the crevices of the rocks, and pours along the bottom of the drift. Gangs of men, each with his miner's lamp attached to his hat, are hard at work picking and delving in the flinty bowels of the earth; and the monotonous clang of the hammer upon the drill is constantly heard, except when everything is in readiness for firing a mine, when all retire to a safe distance, and thunderous reports roll through the rocky corridors. The work of the tunneling is all done by hand, it being cheaper than the machine work in a drift of such narrow diameter.—*Baltimore Gazette.*

LOW'S NECKLACE VANDA.—(*Vanda Lowi*).

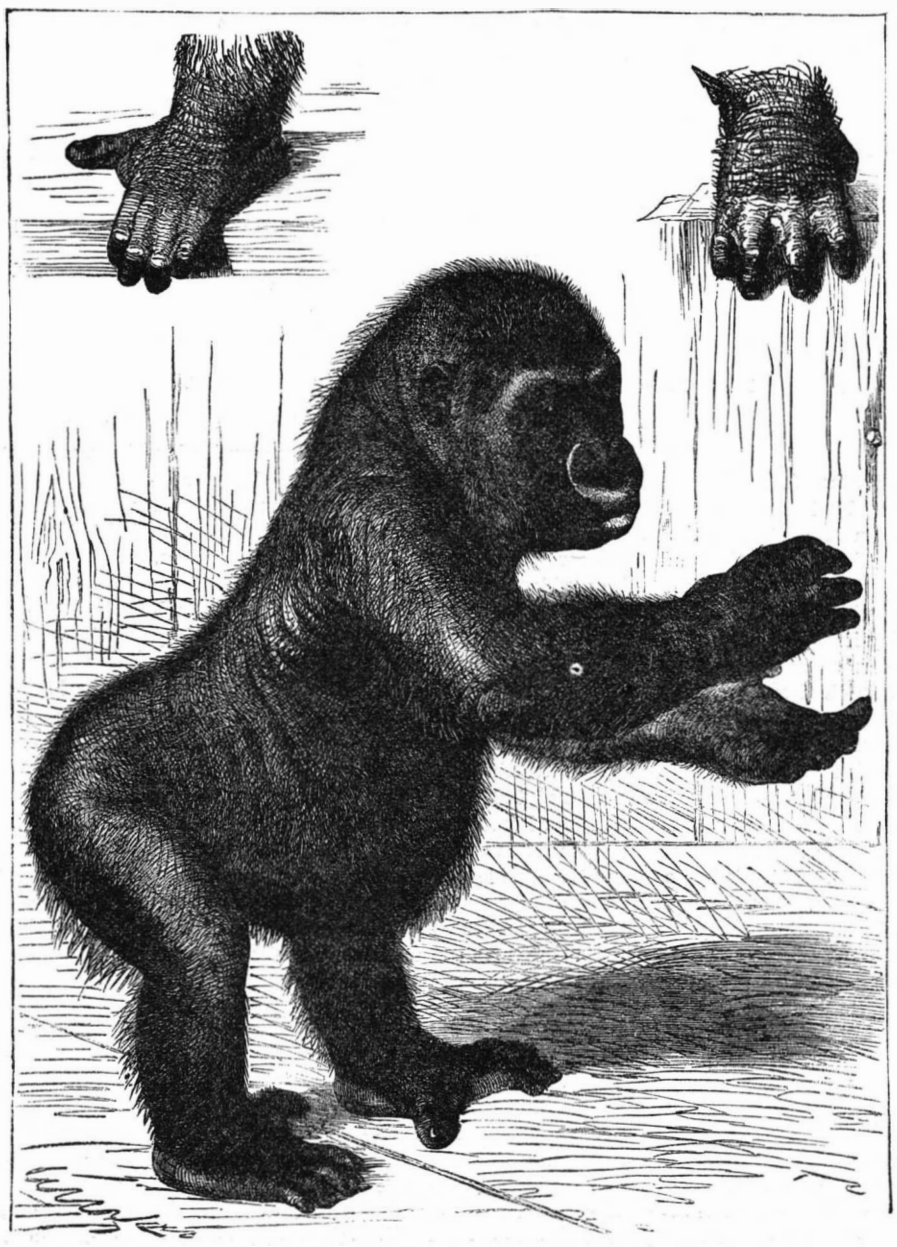
This species is one of the most distinct of all the vandas, and, although as yet not common, it has several times bloomed and been exhibited in England. Although a strong-growing plant, it flowers in a comparatively small state. The plant attains a height of from 2 feet to 10 feet, and has distichous, leathery leaves, 2 feet or more in length. We have other vandas from Malaysia of similar habit, notably *v. Batemani*, from the Philippines, which grows in co-partnery with the glossy leaved *cypripedium lævigatum*. There are one or two characteristics about Low's vanda, however, possessed by no other species. The flowers are arranged on a slender, zigzag raceme, which not unfrequently attains a length of from 6 feet to 8 feet, and when furnished with buds somewhat resembles an elegant necklace, finally changing to a wreath of gold and purple-blotched blossoms, as shown in the annexed engraving, with the trifling exception that the slender flower stem is densely hairy or hispid and not smooth as therein represented. Perhaps the most singular point in the history of this curious plant, however, is the production of flowers of two distinct kinds on one spike.

At the extreme base of the flower stem, say 1 foot or more from the leaf axil whence it emerges, two flowers are produced at about 3 inches or more apart. These flowers are golden yellow, the blotches being very small and scarcely visible, and having moreover a delicate perfume. Then comes a space of 12 inches or 15 inches, and then the ordinary flowers, the petals of which are broader than the basal yellow flowers, and are heavily and richly blotched with crimson purple. This production of two distinct sorts of hermaphrodite flowers on the same spike is, however, only one of numerous instances of the kind now known to botanists. The spikes, which are often longer than the plant which produces them, occasionally trail along the ground, thus forming a ladder to nectar-hunting beetles and other



VANDA LOWI.

insects, just as do the long-tailed petals of *cypripedium caudatum*, or the singularly bearded inflorescence of *attacia cristata*. The plant, which is one not at all difficult to cultivate, is propagated by means of offsets, which sometimes make their appearance on strong specimens.



THE GORILLA—MR. PONGO.

THE GORILLA.

I have had several interviews with Pongo, the gorilla, at the Westminster Aquarium, and at every visit I am more impressed with the interest of this remarkable animal. It is quite evident he is not very arboreal in his habits. He sits nearly always on the floor with his legs tucked under him, exactly as a tailor. His face cannot be called ugly certainly, but at the same time it cannot be called intelligent The nose is much depressed into the face; the lips are even with the nose, and pink inside. He cannot smile, but he grins like a dog. He will snatch and pull away anything put near him. He took a pocket handkerchief from a lady's pocket, put it around his neck, and afterwards wiped his nose with it. This, I am inclined to think, was not imitation, but an accident. He is apparently not right-handed, but uses both hands equally.

If there is any one distinctive point between man and the gorilla, it is in the conformation of the hands. The thumb is exceedingly short, and cannot be used with anything like the facility as in the human subject.

No one seems to have noticed in this specimen the great difference between the human hand and that of the gorilla. In the human hand the three bones forming the finger spring direct from the palm of the hand. In the gorilla, the spaces from the knuckles to the first joint of the finger are united by a membrane, and become practically a continuation of the palm of the hand. The gorilla uses his hand as a foot much more than as a hand. When he progresses the fingers are bent inward on to the first joint of the fingers, thus forming a sort of pad on which the animal walks. When walking the fore arms and hand form, as it were, supports for the rest of the body; in fact, the gorilla's gait may be likened to a man going on crutches. The hind legs are comparatively small

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and much bowed outwards like the legs of a baby. The thumb of the foot has great powers of prehension; indeed, it may be said that the thumb proper is carried on the foot.

It is to be carefully marked that the gorilla has no calf to the leg and no biceps in the forearm. According to my observation, he cannot stand upright without supporting himself by means of some object. I have frequently seen human beings acting the part as monkeys. It will be remarked that in this case the moment the man is able to relax his performance he stands instantly upright; the gorilla, on the contrary, instantly he possibly can do so, drops on all fours on the ground.

As the gorilla walks, it will be seen that his back is almost square. I have ascertained that this great breadth of back is given by the ribs, which are broad and very strong. In the human subject the space of about a hand's breadth intervenes between the bottom of the ribs and the top of the pelvis or hip bones. In the gorilla the ribs come close down on to the top of the hip bone. The hip bones themselves are not spread out laterally to support the weight of the body as in man, but are narrowed as in many running animals. The gorilla has apparently no more voice than a roughish guttural sound. We have not, however, yet seen him in a rage. Under these conditions it is just possible he may make a great noise. I have put my finger into his mouth, and have ascertained that he has no pouch, nor anything like a pouch. He puts everything he can get hold of into his mouth, and on all occasions his mouth and teeth are used as weapons of offence and defence. In this one fact alone there is a vast difference between human beings and gorillas. When men quarrel they always use their hands, and in very exceptional instances their teeth.

The gorilla, as far as I have ascertained, does not use a stick for the purpose of striking, nor does he as yet ever strike with his hands; it is, however, most remarkable that he frequently claps with his hands; in doing this, his right hand is always uppermost. I do not think this is the result of imitation, or that he has been taught; it is, I think, a natural action. I gave him my hat, he placed it before him upon the floor and began immediately to drum upon it.

I am afraid the disciples of Darwin will be greatly discomfited by the advent of this gorilla. If the reader will kindly put his or her hand to the ear, he or she will find a very slight hard little knob on the external edge of the fold of the ear, about a quarter of an inch from its highest part. The presence of this knob, according to Darwin, indicates "the descent" of you and me, my friends, "from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits, and an inhabitant of the Old World.

I was especially careful to examine the gorilla's ear, and I discovered that he *does not wear a knob on his ear*.

Pongo is but three and a half years old, and therefore quite a baby. I was most interested to see how his infantine instinct is more in accord with the human infantile rather than with the adult mind. He is respectful, grave, and somewhat distant towards adult ladies and gentlemen. A little boy and girl luckily came in to see him while I was present. After a while they both began to play in a child-like fashion with Pongo. Gradually they fraternized, and began to play together after the manner of little children. Not being a child, I cannot enter into their funny sayings and doings about nothing at all. So these three, the little fair-haired boy and girl and the gorilla, played together after their own childish fashion for nearly half an hour. Pango evidently liked the little girl best, and I made her experiment on him with ornaments, handkerchiefs, etc.; but no—the ape's brain could not understand the human. Pongo put everything in his mouth, and tried to bite it up.

One little point—the human lips are made for speaking, not so the gorilla's. They are the lips of a beast. Moreover humans have hair on their heads. Pongo's hair is simply a kind of fur continuous with the other covering of the body.

I now come to a point to which I think attention has not been sufficiently called in the examination of the comparative anatomy of the man and the monkey. I mean the presence in the actual brain of that curious body which feels to the fingers like a grit of sand. This is called in anthropotomy (*i.e.*, human anatomy) the "pineal body." I have often examined this pineal body and wondered what the meaning of its presence in the human brain could possibly be. This pineal body is thus described by a high authority in anatomy: "The pineal body consists principally of large uncleated vesicles, and contains some tubular fibers. In a cavity which is formed towards its base is contained a mass of sabulous (sand-like) matter, which is composed of phosphate and carbonate of lime. To this Sœmmering gave the name *Acervulus*. It is found only in subjects after seven years of age, and is in a great degree peculiar to the human subject.

"The subject of the pineal body is very imperfectly known, and although its office has been a theme for some of the wildest speculators in physiological theories, we are still uttterly in the dark respecting it."

Now, has the gorilla a pineal body in his brain, or has he not? I confess I am exceedingly curious, and doubtless the readers of these lines are also curious, to know whether the gorilla has or has not a pineal body in his brain.

Chinese Suspension Bridges.

The most remarkable evidence of the mechanical science and skill of the Chinese is to be found in their suspended bridges, the invention of which is assigned to the Han dynasty, which flourished 1,600 years ago. According to the concurrent testimony of all their historical and geographical writers, Shang-leang, the commander-in-chief of the army under Kaou-tsoo, the first of the Hans, according to Thornton's "History of China," undertook and completed the formation of roads through the mountainous province of Shen-se, to the west of the capital. Hitherto its lofty hills and deep valleys had rendered communication difficult and circuitous. With a body of 100,000 laborers he cut passages over the mountains, throwing the removed soil into the valleys, and where this was not sufficient to raise the road to the required height, he constructed bridges, which rested on pillars or abutments. In other places he conceived and accomplished the daring project of suspending a bridge from one mountain to another across a deep chasm. These bridges, which are called by the Chinese writers, very appropriately, "flying bridges," and represented to be numerous at the present day, are sometimes so high that they cannot be traversed without alarm. One still existing in Shen-se stretches 400 feet from mountain to mountain, over a chasm of 500 feet. Most of these flying bridges are so wide that four horsemen can ride on them abreast, and balustrades are placed on each side to protect travelers. It is by no means improbable (as M. Pauthier suggests) that, as the missionaries in China made known the fact more than a century and a half ago, that the Chinese had suspension bridges and that many of them were of iron, the hint may have been taken from thence for similar constructions by European engineers.

American Institute Exhibition.

Persons intending to exhibit this fall should at once forward their applications for space to the General Superintendent, otherwise they will not be able to secure the room they may desire. The managers are exceedingly anxious to have the exhibition in good shape upon opening day (September 12), and will do so if the exhibitors will only be as prompt as they should be in placing their exhibits in order.

THE STUDY OF THE DISEASES OF THE HUMAN VOICE.

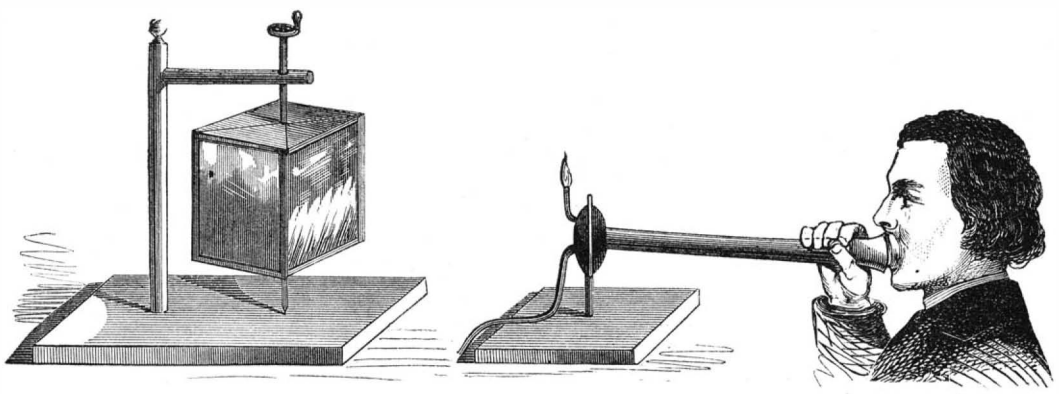
The graphical method of investigation, which has rendered such important services in the study of purely physical phenomena, has of late years been called upon to perform kindred offices for the sciences of physiology and medicine, in order to represent definitely and directly the normal as well as the morbid or abnormal functions of the human body.

Though as yet but little cultivated, it has already given results which have led to discoveries of great practical as well as theoretical interest and importance.

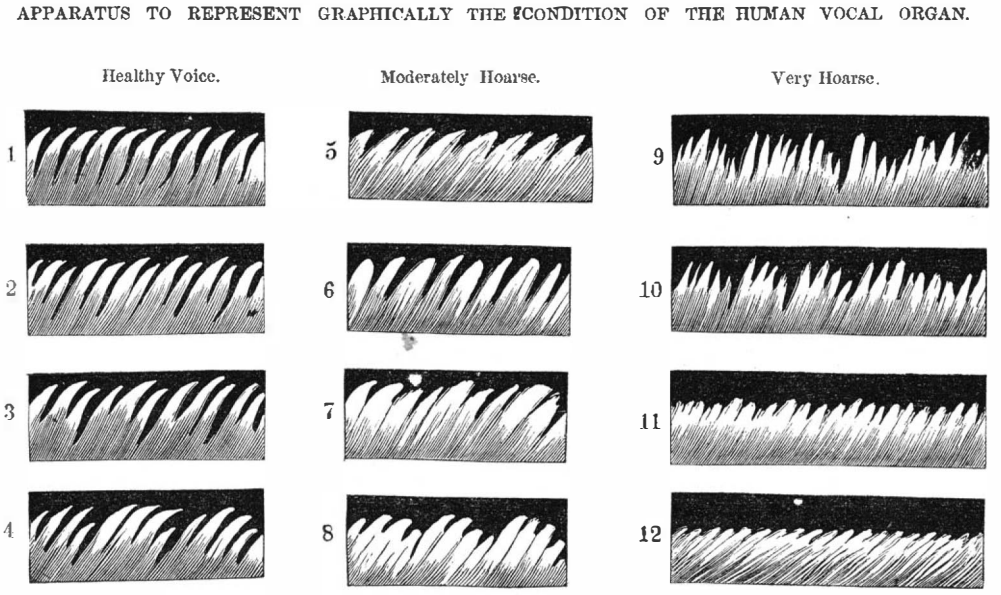
The examination of the character of the pulse in various diseased conditions of the body, more especially of the heart, by means of the apparatus known as the *sphygmograph*, is a notable case in point. From the charts produced in this method one skilled in the art is able to read at a glance not only the nature of the disease, but also the stage at which it has arrived, and the degree of danger existing.

These happy results gave the impulse to similar experimentation regarding the influence of throat diseases upon the quality of the voice.

The apparatus used in this investigation is shown in the annexed engraving. It is ordinarily known as Koenig's flame manometer, though for the present purpose it has been so modified as to be capable of responding to the slightest variations in sounds. It is composed of a large cube whose four vertical sides are covered with mirrors, and which is revolvable about a vertical axis; of a gas jet, burning with a small flame; and of a mouthpiece which terminates in a lenticular box or capsule. A very thin, tense, and impermeable rubber membrane divides this capsule into two compartments, in one of which the sounding tube terminates, while the other serves as a passage way for the gas from the conducting tube to the jet at which it is burned.



APPARATUS TO REPRESENT GRAPHICALLY THE CONDITION OF THE HUMAN VOCAL ORGAN.



FLAME PICTURES OF HEALTHY AND DISEASED VOICES.

On singing or speaking into the mouthpiece, sound waves are produced by the alternate condensation and rarefaction of the air within the tube; the rubber membrane acquires a corresponding rate of vibration, and so modifies continuously the rapidity of the delivery of the gas to the burner, causing the gas flame to leap up and down in unison with the sounds transmitted. On rotating the prismatic mirror this but slightly perceptible motion is rendered distinctly obvious, persistence of vision spreading out the image of the flame into a broad serrated band of light. These serrations vary with the character of the tones produced, as well as the degree of the diseased condition of the vocal chords. In the latter case especially the difference in appearance of the image becomes so striking that a skilled observer can very readily form a correct idea as to the actual state of the vocal organs. The flame pictures shown in the accompanying engraving will enable one to form but a very feeble idea of the great variety and richness of the forms, and the many curious light effects, which are here caused to make their appearance.

The first series of flame pictures shown in our engraving was produced by a normal human voice, the upper variety being the effect of a high note, while the lower three, containing respectively sets of two, three, and four teeth, were produced by successive lower notes. With a proper delicate adjustment of the instrument the differences between a fine, cultivated voice and a defective one were rendered strikingly manifest in a clear, regular, well-defined cut of the teeth of light in the case of the former, every fluctuation in the intensity of the notes being made distinctly visible.

The second series represents a moderate degree of hoarseness; the serrations are but imperfectly formed, and are no longer so regular or so constant in appearance. The tongues of the light are not so clearly cut and are shorter, since the range of vibration of the vocal chords is much smaller.

The third series refers to a severe degree of hoarseness, especially that attending the formation of tubercles in the lungs, syphilis, and various kinds of chronic inflammation. A thickening and partial destruction of the vocal chords here present great obstacles to their vibration, so that in 9 and 10 the serrations have gotten to be very irregular. The two last flame pictures represent an almost complete immovability of the vocal chords, the glottis remaining constantly open, and the passing air capable of setting the chords in but very slight vibration. This method of investigation has not yet reached the limit of its applicability, and further important and interesting results are continually being reached.

To produce a rosewood finish, stain the wood with dilute nitric acid, and grain with burnt umber, and glaze with carmine or lake.

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RICE.---HOW IT IS PREPARED FOR MARKET.

BY COLONEL C. K. HUGER, OF CHARLESTON, S. C.

When the rice is ready for the harvest, it is cut by hand about 12 inches from the ground, and laid across the stubble for two days to cure. It is then tied into sheaves and put into small cocks in the field to more thoroughly dry. After a few days it will be ready to be carried to the barnyard, where usually the thresher is situated, and put into stacks, where it remains until the owner is ready to thresh it out. In some localities it is only removed from the fields daily in sufficient quantities to supply the thresher, which is almost always a frame building, one and a half stories, with high shingle roof, filled with the necessary machinery for separating the rice from the straw. The usual motive power is steam, the boiler and furnace of which should be placed outside the main building and encased in brick. The smoke-stack is frequently of brick, at least forty feet high, and placed at least fifty feet from the building, with an underground flue running to the furnace. This is the best and safest construction; but sometimes it is not practicable, and then an iron smoke-stack is substituted, and when that is the case the main building and boiler house should both be covered with metal, and the exhaust steam not allowed to be vented into the smoke-stack, as it causes to be thrown out a volume of sparks, not only endangering buildings, but also any stacks of rice that may be in the yard or on flats near by. This evil is supposed to be obviated by placing a spark arrester in the smoke-stack; but the experience of practical machinists is that they cannot be recommended as safe, and therefore should be avoided. The speed of the different portions of the machinery is not great; the smallest sized beater, which is the thresher that takes the grain from the straw, revolves not exceeding 600 per minute, and the largest 250, and of course sizes between these at proportionate rates. The speed of the fans varies from 100 to 300 per minute; therefore, if ordinary attention is paid to oiling the machinery, there should be no fear of fire from friction.

As threshing should only be done by daylight, and no artificial light allowed in the building at any time, there will be very little danger of fire; but, as the whole is of an inflammable character, if fire once gets under way the loss will most probably be total. Therefore, as fast as the rice passes through the thresher it should be removed to a storage barn, at a sufficient distance to make it comparatively safe in case of a fire occurring in the thresher, and should be kept there no longer than is necessary to accumulate a vessel load, when it should be sent to market to be sold at once as rough rice, or stored in mill until the owner desires to have it pounded and sold as clean rice. The straw, which is separated from the grain in the thresher, is by machinery delivered outside the rear of the building, and should be removed as fast as it accumulates to a safe distance from the thresher.

This rice straw is a good forage for animals, and valuable as a fertilizer for high land crops; but where it is not wanted for such purposes, it is much used for fuel in the furnace, and in the vicinity of Savannah, Ga., a considerable amount is used in a paper factory, as it is found to be valuable in the manufacture of that article, which is then frequently turned into "genuine Havana cigars." When it cannot be utilized by some of the above methods, it is burnt on the plantation, and the ashes applied as a fertilizer to the land.

Rice pounding mills are of two classes as to fire hazard. First, the mills on plantations, which are nearly all two story frame, shingle roof buildings, and next, the mills in cities, which are usually three and sometimes four story brick, with slate or metal roofs, but all run by steam, with furnace and boilers bricked up outside of building, and containing the same kind of machinery.

The city mills generally have warehouses adjacent to them, as the storage capacity of the mill itself is rarely sufficient for its wants. These mills are always located on some navigable stream, so as to be easy of access to vessels for the delivery to them of the rough, and the receipt from them of the clean rice. When rough rice is sent to mill to be at once pounded, elevators are lowered into the hold of the vessel, and the rice taken out and carried into the mill by horizontal screws, and at once elevated to the highest floor, and run through screws which take out all rubbish, such as bits of stick or straw, and sand. It then passes slowly into large millstones, six feet in diameter, revolving 120 per minute, and set so as not to break the grain of rice, but to cause the hull to split off. From the stones it passes through a fan, which blows the hull or chaff into an apartment, from which it discharges itself by a spout to the outside of the building, and is at once removed. The rice is carried from the fans to bins over the mortars. These mortars hold about four bushels each, and are made of wood, egg-shaped, large end down, lined with Russia iron. The pestles are pieces of timber 8 x 12 inches, ten feet long, shod with a heavy iron boot, and are lifted by arms from the pestle shaft in rear, and dropped about thirty inches into the rice in the mortars. This pounding continues from one to two hours, according to quality of grain, which reduces to flour a skin or coating that was left on it by the stones. It is then emptied out of the mortars, and carried by elevators to the upper part of the mill, and passed through screws, which take nearly all the flour off. It is again elevated to upper floor to screws which separate it into three qualities—whole, middling, and small—and then passes to the brushes. The brushes are cylindrical wooden drums, varying from two to three feet in diameter, and in length from six to ten feet. They are placed on end, the spindles running through an iron bar, and long enough to pass the floor, so as to be easy of access for oiling; as, before this plan was adopted, the spindles could not be got at while working, and have been the cause of fires. This drum is covered lengthwise with strips of sheepskin, wool side in, about six inches wide and eighteen inches long, backed on one side only to the drum, each slip lapping a little the one adjacent to it. The cylinder is then enclosed by a wire screen firmly screwed in position. The rice from the fans passes between the wire screen and the skins. The brushes when working revolve, the largest 300, and the smallest 450 per minute. This motion causes the loose edges of the skin to fly off and rub the grain against the wire screen, driving any flour on it through the screen, and polishing the rice. As it is brushed according to its grade of whole, middling, or small, as previously separated by the screens, it so passes by spouts to tierces prepared for its reception, standing each on a platform to itself, so arranged on a shaft underneath as to give them a slight jerk up and down, which packs the grain as it falls into the tierce. As soon as it is full, it is removed, the head put in, branded, and rolled into the shipping shed, ready to be sent to market. This completes the process of milling. The speed of the different parts of the machinery is, with slight variations, as follows: Pestle shaft, 12 revolutions per minute; millstones, 120; brushes, from 300 to 400, according to size; fans, from 100 to 300, according to size; elevators, 40. It is therefore evident that there should be no danger from friction, if ordinary attention is paid to lubricating. The rough rice, and nothing that comes from it during the process of pounding, is at all inflammable, but, on the contrary, is slow of combustion; but as these mills work at night, carelessness in the system of illumination should be avoided. All lights should, as far as practicable, be fixed, and no hand lamps allowed, except lanterns fully protected under glass; and where coal gas is not used, lard or whale oil should be. In case of a partial loss, the greatest damage would be from water, as fresh water softens the grain so much that, if saved from heating and sprouting, it never recovers its original firmness, and is therefore very seriously deteriorated in value; and if with salt water, it soon becomes as offensive as decayed flesh, and is valueless.

These mills are costly, and generally pay well, and every precaution is used by those in charge to protect them from accidents; but still they are classed as extra hazardous, and some companies, particularly the English, write only very small lines on them, or decline them altogether. This I can only attribute to a want of knowledge of the risk. The writer has been familiar with the rice interest of South Carolina for over thirty-five years, and can remember the burning of only three pounding mills in that time, and therefore cannot regard them as extra hazardous.

The particulars as to speed of machinery, and much other valuable information, have been kindly furnished me by two of the most experienced practical millers in the State.

THE KEELY MOTOR DECEPTION.

The Keely Motor lunatics are still at work, according to the Philadelphia *Times*. The "directors" it is said, held a meeting, August 8, to witness Keely's experiments with a "new" machine. The following description of it as given by the reporter of the above paper is as clear as mud:

"The machine is made of wrought iron and cast steel. It consists of spheres, basins, standing tubes and small reservoirs, with a wilderness of connecting rods, valves and tiny copper tubes. A globe of cast steel, four feet in diameter on the outside, holds only twelve gallons. The center cavity is in a shell of nine inches thickness. The perpendicular tubes that reach from floor to ceiling, at the other end of the machine, have a central chamber of three inches diameter, the surrounding metal being three inches thick, and outside of it, one above the other, are huge rings of wrought iron shrunk upon the pipe. The copper tubes appear to be one fourth and one half inch in diameter, but the aperture in their center is not large enough to admit a pin head."

Mr. Keely made nine tests, and with $\frac{5}{20}$ suspension of the water column and 10 lbs. air he produced 11,000 lbs. pressure to the inch, and had to shut off the pressure because the gauge would not stand more. The condensing apparatus into which the vapor is discharged is a cylinder that holds three gallons of water, and so strongly bolted and barred that it looks as if made for the discharge of a twenty inch projectile. Its design is to reduce the vapor, the force of which has just been used, to water, for use over and over again in the working of the machine. The *Times* representative had an opportunity to test the quality of the water introduced into the machine from the hydrant and that in the condenser after its power had been used. He drank a pretty good quantity from each cylinder and found it cold, and free from any foreign taste, such as would probably be caused by explosive powders. He had a chance to breathe the mysterious vapor while the wonderful pressure was upon the tubes. It was discharged into his hands, his eyes, and mouth. It was perfectly cold and dry. Within a month, when he has made all his experiments with his now completed machine, Mr. Keely will endeavor to show the extent of its power.

In his talk with the *Times* representative Mr. Keely said: "This is a new substance; a new force, altogether unknown to science; I don't pretend to be the inventor; I discovered it by accident. I could work this machine up to ten thousand horse power if the metal would hold. I shall certainly work it upon a two hundred horse power engine soon. The little machine you saw in the office, up stairs (it is only nine feet long, two feet wide and three feet high in its highest part), is the most powerful machine ever constructed. It was built for us by Mr. Willard of Bordentown, who was drowned a few days ago. It is a quart machine—that is to say, it uses only a quart of water. With the condenser that I have now nearly complete I will make that quart of water produce a thousand horse power motion of sufficient duration to run a steamship across the ocean."

One of the directors said: "We have been laughed at and called cheats and impostors, but out of the original company who joined in raising the $120,000 already expended upon this invention only three or four have withdrawn. We are the original crowd, and we don't think of weakening. In a month or two now all Mr. Keely's tests will be finished, and we will show the world whether he is the greatest inventor or the greatest humbug of this age. Scientists, machinists, and learned societies are invited to come and make every test they can think of."

The purport and substance of all the foregoing bosh is, we suppose, that the Keelyites are short of funds and are about to make a new effort to shove off upon the unwary, another batch of their worthless stock.

EBURINE.

M. Latry has recently exhibited to the French Society for the Encouragement of the National Industry a new compound, to which the above name is given, and which is composed of ivory or bone pulverized, and in some cases mingled with agglutinative material. The latter is not, however, uniformly necessary, as by M. Latry's process the dust can be caused to agglomerate by simple pressure and heat. The operation is rather a difficult one, as too high a temperature produces disaggregation; but by experiment M. Latry has succeeded in so regulating the heat applied to the moulds by observing the behavior of wafers of fusible metal, that instead of a porous and almost friable mass the resulting product is extremely hard and resistant. It is believed that the natural organic material in the bone or ivory dust becomes partially melted, and so serves as a cement.

The color of the eburine is a grayish-white; and to make it pure white, suitable pigment is added. This, however, necessitates the further addition of a little albumen or other agglutinative material, as already noted. The material may be colored any hue, and is best utilized in combination with the so-called "*bois durci*," or wood concrete, which is made of sawdust and beef's blood pressed also in moulds under heat. The eburine serves for the raised portion of ornamentation of furniture, etc., and when moulded with the "*bois durci*," adheres to it with great firmness. It does not crack, and when not rendered too hard may be worked with ordinary wood tools. The grain of the hard variety is so fine that by suitable coloring it is easily made to imitate certain stones, such as jasper, malachite, and lapis lazuli, or by painting beautiful and accurate imitations of cameos and mosaics may be produced upon it. The invention appears to be of considerable industrial importance, as it opens a new mode of utilizing waste products, for which hitherto there has been comparatively little employment.

ENGINE "SPURTS."

There are numerous instances of collisions and other marine casualties on record, from which it would appear that the danger might have been avoided had there been some means on board the injured vessels for developing a sudden and great increase of power in the engines for a brief length of time. A long and heavily laden steamer, for example, is not easily manœuvred even under full steam power, and when moving at high speed it is a matter of considerable difficulty to check her way. Similarly a heavy war vessel, in order to avoid torpedoes, may find a means of suddenly swerving, backing, or shooting ahead a potent safeguard against suddenly discovered obstacles.

M. Bertin proposes a simple means of effecting this object, which merely involves providing each vessel with a blower, by which strong jets of air can at a moment's notice be forced in at the base of the smokestacks in order to increase the draft. This has recently been tested in France on board the frigate *Resolue*. Combustion was found to be nearly doubled in activity under the transitory action of the jets of compressed air. The motive power developed was equal to 1·8 times the primitive power of the engines; and the increase of consumption of fuel was 20 per cent. This last is of no importance, however, in view of the necessities of the case and the brief period over which the augmented power would in most instances be excited.

Colored Borax Varnishes.

It is well known that an aqueous solution of borax is able to dissolve shellac, forming a kind of varnish, to which any desired color can be imparted by mixing with pigments. Major Dr. Kahl of Dresden has communicated to the Dresden branch of the Saxon Society of Engineers the results of a large series of experiments made with these varnishes. He reports that they are very cheap and dry very quickly, but they scale off from wood too easily. When this varnish is colored black with india ink and applied to paper, it possesses a fine gloss, but other colors, especially carmine, when mixed with this solution acquire an impure shade, and many pigments cement together in this solution, forming a hard and totally useless mass. The black shoe polish sold for ladies' boots is often made by adding some black pigment to this shellac solution. For bronze boots, rosanilin may be dissolved in any alcohol varnish.

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The Probable Distance of the Sun.

A particularly good opportunity of determining the distance of the sun, by observations of the planet Mars at its opposition, occurs in August and September of the present year, the planet being about that time in perihelion, or nearest the sun in its eccentrically elliptic orbit, within a fortnight of its being in opposition to him from the earth. The result of this is that in the early days of September, Mars approaches us to within a distance of about thirty-five millions of miles. Advantage will be taken of this near approach to obtain a value of the solar parallax and distance; and all astronomers wish good-speed to Mr. David Gill, who is now proceeding to the Island of Ascension for that purpose, taking with him an excellent heliometer belonging to Lord Lindsay, and made use of by him in observing at Mauritius the transit of Venus over the sun's disk, in December, 1874. With this instrument, Mr. Gill proposes to make observations of Mars and neighboring stars for comparison, when east and west of the meridian, so as to deduce the parallax of Mars from its parallactic change of position in the interval, owing to the diurnal rotation of the earth. This method has been suggested before, and partially carried out (but not sufficiently to obtain a reliable determination by it) at the last favorable opposition of Mars, in 1862. That opposition, however, was utilized very fully in another way, by making a large number of meridian observations of the planet at stations in both the northern and southern hemispheres, so as to give parallactic displacement at different places, instead of different times. The most complete discussion of all these observations was made by Professor Newcomb, of the United States Navy, and published by him as an appendix to the Washington Observations for 1865. The final result he arrived at from them was the value 8″·855 for the solar parallax. We will compare this with that obtained by the transit of Venus. The observations made of the transit in 1874 have not yet been fully reduced, and it would be premature to make use of them till the reductions are completed. The last preceding transit of Venus was that of 1769, about some of the observations of which there was, for a considerable period of time, a misunderstanding, which led to their being supposed to give a much smaller parallax and larger distance than was fairly deducible from them. This was particularly the case with regard to the observations made at Otaheite (or Tahiti) by Captain Cook and Mr. Green, as was satisfactorily pointed out in 1868 by Mr. Stone, now Astronomer-Royal at the Cape of Good Hope. His improved reduction of all the observations of duration of transit in 1769 gave 8″ ·91 for the solar parallax; and we may reasonably give this a weight of half, in combining it with the result obtained by the opposition of Mars in 1862, to conclude what may now be considered the most probable value of the sun's parallax and distance. Such combination gives for the parallax the value 8″ ·873; and as sun's distance = earth's equatorial semi-diameter (*i.e.*, 3962·5 miles) × cotangent equatorial horizontal parallax, we thus obtain 92,113,600 miles for the present most probable mean distance of the sun. It will be interesting to see how this agrees with the value to be derived from the last transit of Venus and the forthcoming opposition of Mars, when the reductions of both are completed.—*King's College Magazine.*

Japanese Fans.

The folding fan is a Japanese invention. Even to this day the fan forms an integral portion of the national costume of Japan, and plays a large part in the every day life of that country.

An almost fabulous number of fans are exported from Japan to all parts of the world; no fewer than 3,000,000 fans, valued at $90,000, were shipped from Hiogo and Osaka in 1875. Osaka is the principal city for the manufacture of the "ogi," or folding fans, which are almost exclusively those exported, all descriptions of the bamboo kind being made there, the figures, writing, etc., being executed in Kiyoto. The principle of division of labor is carried out a long way in this branch of industry. The bamboo ribs of the fans are made by private people in their own houses, and combinations of the various notches cut in the lower part are left to one of the finishing workmen, who forms the various patterns of the handles according to plans prepared by the designer. In like manner the designer gives out to the engravers the patterns which he thinks will be saleable, and, when the blocks have been cut, decides what colors are to used for each part of the design, and what different sheets are to be used for the opposite sides of each fan.

When these sheets, with the sets of bamboo slips which are to form the ribs, have been handed over to the workman, he, in the first instance, folds them so that they will retain the crease. This is done by putting them between two pieces of heavily oiled paper, which are properly creased. The fans are then folded up together, and placed under pressure. When sufficient time has elapsed, the sheets are taken out, and the mould used again, the released sheets having been packed up for at least twenty-four hours in their folds. The ribs, which are temporarily arranged in order on a wire, are then taken and set in their places on one of the sheets, after it has been spread out on a block and pasted. A dash of paste then gives the woodwork adhesive powers, and that part of the process is finished by affixing the remaining piece of paper. The fan is folded up and opened three or four times before the folds get into proper shape, and by the time it is put by to dry, it has received an amount of handling which Japanese paper alone would endure. When the insides are dry, the riveting of the pieces together—including the outer covering—is rapidly done, and a dash of varnish quickly finishes the fan.

The sale of fans in the olden time in Japan seldom exceeded 10,000 for the whole country; times have changed however, for the foreigner has set foot there, and the old days of seclusion and limited trade are over. The number of fans ordered for the Philadelphia Exhibition alone amounted to over 800,000, at a cost of about $50,000.

The designs for the mounts of Japanese fans are sometimes of a very interesting description, and always strikingly unlike the productions of European art. One peculiarity of the art of Japan has been pointed out by a recent critic. If a Japanese artist has any space to adorn, he does not seek out the center and place his ornament there, for although that would be the obvious means of securing proportion, it would not satisfy a taste directly derived from a study of nature, where proportion is rather suggested than expressed. We find, therefore, that the Japanese artist, imitating the ways of nature, throws his design a little out of the precise balance and trusts to the spectator to judge of the result by an association of impressions similarly derived.—*Harper's.*

Resistance of Wires.

This is a subject on which several series of researches have been made, but the results have been discordant. Thus MM. Becquerel, Siemens, and Matthiessen, with comparatively good agreement, have found in the case of copper, silver, gold, iron, and platinum, a diminution of resistance through annealing. M. Mousson, on the other hand, in the case of steel wires hardened by extinction, also obtained a decrease of resistance through the softening; but in steel wires, which were hardened by drawing, as also in copper wires, he got an increase of resistance through annealing.

With a view to explain this discordance, and to examine the behavior of a large number of metals, M. Chwolson, of the St. Petersburgh Academy, has investigated the action of softening through annealing (either by means of a strong electric current or a gas flame) on the galvanic resistance of hard-drawn wires of 15 different metals—namely, platinum, platinum-iridium, palladium, aluminum, aluminum-bronze, iron, steel, copper, brass, German silver, zinc, silver, lead, magnesium, and cadmium. The last of these gave no distinct results, whereas, in the case of all the others, the question was answered unequivocally. We will not here further describe M. Chwolson's method, but merely give the results of the measurements in the following table, in which under A is represented the maximum of the observed change of the resistance in consequence of the first glow; under B the maximum of the resistance-change at a strong glow; and under C the greatest change of the resistance at extinction, all explained in percentage of the original existence of the hard drawn wires:

Wire.	A.	B.	C.
Steel	−4·8 p.c.	+8·6 p.c.	+0·6 p.c.
Iron	−0·4	+5·3	+0·7
Brass	−8·3	+0·8	+1·0
Copper	−2·9	+1·4	+0·4
Platinum	−5·3	+5·8	+0·7
German silver	−1·1	+2·0	−1·8
Aluminum bronze	−8·0	—	+2·7
Palladium	−0·4	—	+0·1
Platinum-iridium	−3·2	—	+0·3
Silver copper alloy	−11·3	—	+1·7
Zinc	−1·8	—	—
Aluminum	−1·9	—	—
Lead	+0·5	—	—

We see from this table that, in the case of twelve out of thirteen metals, the galvanic resistance is diminished in the softening of the wires in consequence of the first not very strong glow; only lead forms an exception, showing a slight increase. On increased and strong glow, six metals showed a distinct increase of the resistance; consequently an effect opposite to that of the softening. This double action of glow, in the case of some wires—for example, iron—where the decrease through softening is slight, and the increase through increased glow is strong, can only be observed by very careful measurements. That the second action is not simply to be attributed to an oxidation of the wire, is shown clearly by the high value obtained for platinum (with strong glow the resistance again rose above its original amount), and the comparatively very small value found for brass and copper. In extinction of the wires in water, lastly, nine out of ten metals showed an increase of the resistance, and only brass (German silver?) showed a considerable diminution of it.

The double action of annealing here demonstrated sufficiently explains the contradictions in the results of previous investigators.—*Der Naturforscher.*

Inventions Patented in England by Americans.

July 19 to July 30, 1877, inclusive.

BOOTS AND SHOES.—C. Edwards, Jamaica, N. Y.
CARDING ENGINE.—R. F. Barker (of Boston, Mass.). Manchester, Eng.
DRYING FRUITS, ETC.—A. J. Reynolds, Chicago, Ill.
ELECTRICAL MACHINE.—T. A. Edison, Menlo Park, N. J.
EYELET.—James Whitehead *et al.*, Cranston, R. I.
FILE HOLDER.—Nicholson File Company, Providence, R. I.
FURNACE.—W. Stewart *et al.*, Paterson, N. J.
HOP PICKING MACHINE.—H. G. Locke, Waterville, N. Y.
LOOM.—E. J. Bicknall, Providence, R. I.
RAILWAY CARRIAGES.—E. P. Kellogg, New York city.
ROCK DRILL.—A. A. Goubert *et al.*, New York city.
SEPARATING PRECIOUS METALS.—A. K. Eaton, Brooklyn, N. Y.
SIGNALLING.—J. L. Plimpton (of New York city), London, Eng.
SPINNING RINGS.—F. Rabeth, Providence, R. I.
SPINNING MACHINERY.—John Good, Brooklyn, N. Y.
SPRING MATTRESS.—T. L. Snyder, Montclair, N. J.
STOP NOTCHES.—H. A. Lugrin *et al.*, New York city.
TYPE-DISTRIBUTING MACHINE.—D. Reynolds, Albany, N. Y.
WHEELS.—James Bowson *et al.*, South Pittsbury, Tenn.

Recent American and Foreign Patents.

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NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED PIPE COUPLING.

Rufus H. Moss, Salem, Oregon.—The object of this invention is to provide a coupling for uniting pipes used in conveying hot air for heating cars, that may be quickly coupled and readily uncoupled. It consists of a cylinder attached to the end of the pipe that conveys the heated air. In this cylinder a tube is placed which is provided with a flange or collar which fits the cylinder, and is packed to insure an airtight joint. A spring presses against a collar and throws out a tube provided with catches, which seize and retain the collar of the coupling to be united. The parts of the coupling are alike on each end of the car, and when the parts on adjacent cars are united, the catches of one parts engage the flange of the other. The tube and flange move longitudinally in the cylinders, as the cars move toward or from each other in running, and when the couplings are detached the valve closes automatically, preventing the escape of air.

IMPROVED PROCESS AND APPARATUS FOR COATING METAL ROLLERS.

Henry Wilde, Manchester, Eng.—This invention consists in a method of securing a sufficient amount of adhesion between the iron and deposited copper surfaces to enable the roller to withstand the various engraving and other operations without the separation of the metals. For this purpose the iron roller, before receiving a coating of copper from a hot cyanide solution of copper, is heated to a temperature ranging from 150° to 212° Fah. by plunging it into boiling water, or by other means. The roller, after receiving a film deposit of copper from the cyanide solution, is then transferred to the bath containing a sulphate solution of copper, where it receives one or more thin coatings of copper. These coatings are subjected to considerable pressure by the action of a burnishing roller of hardened steel, for the double purpose of forcing the deposited copper into closer contact with the iron, and detecting any want of adhesion between the two metals. The burnished coppered roller is then replaced in the bath of sulphate of copper solution, and subjected to the action of the electric current until the desired thickness of copper deposit is obtained. Attempts have been made from time to time to substitute iron rollers covered with a thin layer of copper by means of electricity for the solid copper rollers used in calico printing, and in other processes; but, owing to the expense of the battery power and the slow rate at which the copper was deposited in the reguline state, such attempts have not hitherto been commercially successful.

IMPROVED FOLDING GRATING FOR WINDOWS.

Calvin T. Steckel, Brooklyn, N. Y.—This invention is intended as a substitute for the fixed iron gratings or bars in basement, store, and other windows, so as to provide a shutter that may be folded and turned, making the room more cheerful, and facilitating the cleaning of the windows, etc., while combining, when locked, the same degree of safety as the bars, and is a combination of a folding lazy-tong shutter with a fixed and slotted hinge of the window casing, to fold and turn the shutter. The folding shutter is burglar-proof, furnishing the same protection as the fixed grating, but giving, in addition thereto, the great convenience of opening them during the day, and presenting a neater appearance without the objectionable features of the rigid bars.

IMPROVED CANAL LOCOMOTIVE.

Gabrielle De Nottbeck, New York city.—This invention has for its object the construction of a locomotive which will practically run in a canal, the rails or track being laid upon the bed of the canal, and the body of the locomotive raised above the water and mounted upon standards, to which the driving and transporting wheels are applied. Canal boats have been propelled by means of locomotives or traction engines which run on the sides of the canals; but the power in such instances was oblique to the length of the boats, and the resistance was very great; but this locomotive is designed to run in a canal, and in a direct line with the boat which it draws. In practice the body of the locomotive will be entirely out of the water, and it will be provided with a hook at each end for the attachment of a boat.

IMPROVED LEATHER CRIMPING MACHINE.

Jason Smith, Charlestown, Mass.—This invention consists in the arrangement, in a suitable frame, of a tree or form rigidly supported by standards attached to a crossbar of the frame, and in plates that slide in grooves in the standards, one upon either side of the tree, and carry wedge-shaped or beveled pieces having the same curvature as the tree or form. It also consists in a clamping device for clamping the leather, and carrying it down over the tree, and in smoothing plates for pressing the leather smoothly upon the tree, and in levers and screws for operating the various parts.

IMPROVED BALANCED VALVE.

William Hardwick, Erie, Pa.—This invention relates to certain improvements in balanced valves of that class in which the two parts of the valve are made adjustable toward or from each other. Said improvements consist mainly in the arrangement of a stuffing box through which the bolt connecting the parts of the valve passes, and the arrangement of springs in connection with the bolt and the two parts of the valve for the purpose of holding the latter in proper position.

NEW MISCELLANEOUS INVENTIONS.

IMPROVED CURRYCOMB.

Thomas D. Bennett and Horace B. Moody, Harrisonville, Mo.—This invention relates to an improved currycomb for horses, and consists of rotary combs, and an arc-shaped stationary comb, attached to a suitable handle. The crossbar may be plain or provided with teeth on upper side, to serve as a mane and tail comb. The rotary combs raise the hair and admit the stationary comb to enter with great facility, so as to effectually clean the skin.

IMPROVED TOY BUZZ.

James B. Wells, Cincinnati, O.—This invention has relation to a toy known as a "whirligig;" and it consists in a thin circular plate or disk surrounded by leaves or semi-circles so shaped and arranged that when rapid rotation is given to the disk a whistling sound is produced. This toy will be struck out of very thin sheet metal, and scraps of tin may be utilized for the purpose.

IMPROVED BRUSH.

Randall Bisbee, New York city.—The object of this invention is to improve the construction of metallic brushes, so as to enable them to be made lighter and neater, and adapt them to receive any desired kind of a back. Wires take the place of ordinary bristles, and are placed through a rubber plate, with their heads resting against the inner side of the plate. A leather plate is placed over the heads of the wires, and between them

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and the back, which is a metal plate, through which, around its edge, is formed a row of holes, punched from the outer ide in such a way that the burrs of the holes may be passed into or through the rubber plate, so as when the edge of the back is turned down upon the rubber plate they may hold it securely.

IMPROVED ARTIST'S APPLIANCE.

William H. Brownell, Brooklyn, N. Y.—This invention relates to a novel and useful improvement on cases or boxes which are designed for containing artists' brushes, paints, etc., and especially designed for outdoor sketching. The nature of this invention and improvement consists in combining with a portable paint box or artist's case an easel adjustment, which will firmly clamp and safely hold the tablet or material to be painted on in a convenient position for the painter.

IMPROVED MEMORANDUM BOOK.

William A. Cooke, New York city.—This improved memorandum book is so constructed that the inside book or the stubs of the inside book may be removed and replaced with a new book, which may be made of any desired size and thickness, and will open flat and close flat. The invention consists in a metal plate, provided with the loops and fastening wire, in combination with a cover and the inside book, and in the inside book, formed of an odd number of sections, to furnish a positive center to receive the fastening. The inside book is made of three, five, seven, or any other desired uneven number of sections, and each section may have any desired number of leaves, so as to make a book of any desired thickness. The sections are sewed together, and may be still further secured by a paper pasted upon their rear edges. The object of always having a section in the center is to have a firm hold for the fastening that connects the inside book to the cover.

IMPROVED OPEN-FRONT HEATING STOVE.

Francis E. Thompson and Daniel Knappenberger, Belknap, Pa.—This invention provides an improved heating stove that combines the cheerfulness and advantages of the open grate with the economical features of the common heating stoves, and which provides, also, a continuous and conveniently regulated supply of pure heated air, acting as a ventilator and dust escape in all the seasons. The stove rests on the floor and against the wall with or without feet, the outer shell never becoming heated to such an extent as to be dangerous. If feet are used, they may be made of cylindrical form, and wide enough to correspond with the bottom apertures, so as to conduct the air. The stove economizes heat and fuel, ventilates without introducing cold air, draws off the dust, so as to provide a purer air in the room, and admits a quick fire at any time, without blowers, by the folding shield. The stove can be made ornamental in appearance by attaching a fender and hinged side brackets, the whole forming a heating stove of superior qualities.

IMPROVED BALLOON.

Washington Beckley, Louisa, Ky., assignor to himself, David W. Garred, and Millard F. Garred.—The object of this invention is to furnish balloons which shall be so constructed that they may be made to ascend and descend an indefinite number of times without varying the amount of gas in said balloons, and without the use of sand or other ballast, adapting them for use in aerial navigation, in raising stone and brick in erecting high buildings, and for various other purposes. The invention consists in the mode of controlling the descent and ascent of balloons and other vessels floating in the air by the buoyancy of gas, by the compression and expansion of the gas contained within balloons or vessels, and in the combination of the cylinders, one or more, provided with the valves opening inward, and the valves opening outward, and the condenser provided with the valve opening inward, with each other, to adapt them to be applied to a balloon for regulating the volume of gas contained in said balloon to control its buoyancy. With this construction the balloon is filled with sufficient gas to raise and carry the desired weight. When the balloonist wishes to descend he operates the mechanism and compresses the gas into the condenser until the specific gravity of the balloon is greater than that of the air in which it floats, and it descends. Should the balloonist wish to check or stop his descent he opens a valve and allows enough gas to escape from the condenser into the balloon to effect his purpose, so that he can ascend or descend any desired number of times without losing any gas, and without throwing out any ballast.

IMPROVED PEN AND PENCIL CASE.

James B. Smith, New York city.—This invention relates to cases designed either for pencils or toothpicks; and the nature of this invention consists in an arrangement of tubes within the stock or outside barrel, whereby the exposed part of the pencil holder will be perfectly rigid, and strongly supported by an interior immovably fixed tube, and this is made without slotting or perforating the exposed parts of the case. Great strength and rigidity is afforded to the pencil nib when it is projected. At the same time it is a solid pencil case—that is to say, its outer shells are not slotted nor perforated. It is obvious that a toothpick may be fixed to the pencil tube or stem, and rendered rigid and strong by this improvement.

IMPROVED SAW-SET AND FILE GUIDE.

Henry C. Root, Virginia City, Nev.—This invention furnishes a simple and reliable device by which the teeth of a saw may be set and filed in convenient manner, the device being readily adjusted on a bench or other support for either operation, and used for either purpose, as required. The invention consists in adjustable clamping jaws pivoted to and secured by a clamp piece to the bench or table, and the combination of parts necessary to the adaptation of the device to the purpose of setting a saw or filing it.

IMPROVED OVERALL.

Jacob Wallach, New York city.—The object of this invention is to furnish for the use of working men overalls of strong and durable construction, made with a view to sustain the strongest wear without ripping of seams and tearing of pockets; and the invention consists of a pair of overalls having flat seams, and exterior strengthening stays running over the seams, and stitched at both sides of the same. The exterior seam covering stays may be made of leather, canvas, or other material suitable for the purpose, they imparting a high degree of strength at the seams, and preventing the ripping or tearing open of the overalls along the seams so covered. A better and more durable make of overalls is thereby produced, which resists in superior manner the wear and strain to which overalls are exposed, and which strengthens them at the points most liable to wear.

IMPROVED REED FOR MUSICAL INSTRUMENTS.

William Spethmann, New York city, assignor to himself and Elias Durlach.—The object of this invention is to furnish an improved reed for toy trumpets and other reed musical instruments; and the invention consists in a musical reed, in which the reed or reeds are cut out of the body of the plate, so as to be in one piece therewith, and having corrugation in the plate.

IMPROVED CLOTHESPIN.

Edwin F. Clearwater, Carmel, N. Y.—In this clothespin the jaws that are connected together near their centers by staples, which are driven into them at each side, and form pivots upon which the jaws move. The jaws are concave from their rounded ends to the staples, making them sufficiently elastic to clasp clothes of any thickness without breaking. The manner of using this improved clothespin is as follows: The pin is placed over the clothes upon the line, and the cam lever is turned upon its pivot, bringing the cam into contact with the opposite jaw of the pin. The motion is continued until the end of the cam lever is above the line of its pivot, when the jaws are securely locked. By this improvement springs are dispensed with, and a clothespin is furnished which is inexpensive, durable, and efficient.

IMPROVED COMBINED OVERALLS AND JUMPER.

Samuel H. Emanuel, Gloucester, Mass.—This invention relates to an improvement in combined overalls and jumper, and has for its object to increase the strength and durability, improve the fit and appearance, and lessen the cost of such garments. The great advantage secured by this improvement is that the seams most liable to rip in garments of ordinary manufacture are avoided, and a stronger and better fitting garment is produced. In this combined overalls and jumper the sections are united by seams at the back, and have the leg portions united by seams on the inner side of the leg, the whole being made without seams at the sides or around the waist, and provided with pockets and pocket openings.

NEW AGRICULTURAL INVENTIONS.

IMPROVED HOE HANDLE.

William R. Littleton, Valley Mills, Texas.—This invention is designed to furnish a device for tightening handles in the eyes of hoes, axes, etc. The handle has a hole, grooves, and a longitudinal slot in combination with a collared bolt having thereon two screws of different diameter, and with threads running in different directions. For the various uses to which it may be applied it is simple in construction, easily and quickly operated, effective and reliable in operation.

IMPROVED MACHINE FOR PRESSING HAY, ETC., FOR FUEL.

John E. Hackett, Caledonia, Minn.—The object of this invention is designed to furnish an improved machine for pressing hay, straw, etc., for fuel. In the construction of the machine by bearing down upon the outer end of a lever, a roller will be raised against a shaft, so as to compress the hay as it is being rolled upon this shaft sufficiently to adapt it to be used for fuel. The shaft is so formed that it may be drawn longitudinally from its bearings, to withdraw it from the roll of hay.

IMPROVED MILK COOLER.

Edward F. Prescott, Charlotte, Mich.—This invention relates to an improved milk cooler and aerator, by which the milk is conducted over a series of cooling channels, so as to be thoroughly cooled and aired; and it consists of a tank with a pan having at one end a milk receiver, from which the milk is conducted through an exit opening and gate over a series of inclined channels, divided by raised longitudinal partitions, or ridges extending alternately from one end to a short distance from the other end of the pan. The hollow partitions admit the cooling water to act on both sides of the channels and increase the size of the cooling surface, while the fall in the channels imparts a revolving motion to the milk from the sides and bottom of the cooling channels to the center and surface of the milk, thus bringing the globules of milk to the air in rapid succession, and the warm milk to the bottom, so as to air and cool the milk thereby in quick and effective manner during the passage over the channels, which are all in contact with the water in the tank, that is filled up to the level of the highest channel.

IMPROVED MOWER.

Isaac N. Hall, Garden Grove, Iowa.—The object of this invention is to improve the construction of the mechanism for driving the sickle bars of mowers and reapers, so as to simplify its construction and lessen the jar and strain which accompanies the use of the crank wheel and pitman, and thus enable the machines to be made lighter, and to be run with less power than is necessary with the ordinary constructions. The invention consists in the combination of a large gear wheel, a small gear wheel, a shaft, and a diagonally flanged cylinder with the inner ends of two sickle bars, cutter bar, and drive wheel. The sickle bars are placed the one above the other in seats in the cutter bar, and in the guards attached to said cutter bar. The inner ends of the sickle bars may be directly opposite each other upon the opposite sides of the cylinder, so as to come to a rest and change their motion at the same time, or one may be a little higher than the other, so that one may come to a rest and change its motion a little in advance of the other.

IMPROVED COTTON CLEANER.

Charles O. Thomas and Thomas Robertson, Murfreesborough, Tenn.—The object of this invention is to furnish an improved machine for removing dust, sand, and dirt from seed cotton before it is ginned, and which shall be simple in construction, convenient in use, and effective in operation, producing a much better sample of lint cotton than when ginned without being cleaned. It consists in the combination of a cylinder, provided with an inner circle of longitudinal rods and a central rotary shaft, having spirally arranged pins, the latter beating the cotton against the rods and carrying it round and round the cylinder until the discharge is reached.

IMPROVED GATE.

Daniel Barrett and James F. Quinn, Wilmington, Ill., assignors to said Quinn.—This invention belongs to that class of gates that are operated from the vehicle or from horseback without dismounting; and it consists of a gate guided by rollers and moved by a windlass having long shafts, which are provided with cranks that may be operated from a carriage or from horseback.

NEW TEXTILE INVENTIONS.

IMPROVEMENT IN DYEING YARNS AND FABRICS IN ANILINE BLACK.

William J. S. Grawitz, Paris, France.—The novel chemical reactions of this invention consist in the concurrent action on aniline oil or on its salts, of certain metallic salts and soluble chromates or bichromates of chlorates, without the necessity of exposure to air. The action of the metallic salts may either precede or follow that of chromates or bichromates, and both may be performed with or without the aid of heat.

IMPROVED CLOTH FINISHING MACHINE.

Herman Springborn and Christian H. Baush, Holyoke, Mass.—This invention relates to machines for finishing woolen cloth; and it consists in the combination of a perforated steam pipe for directing jets of steam against the surface of the cloth as it enters the machine; a rotating brush and a plush roller for brushing and finishing the surface of the cloth; a heated stationary bed and a roller fitted to the same, for hot-pressing the cloth; a hollow roller, through which passes a current of cold air or water for cold pressing; a device for rolling, and also a device for folding, the cloth. The object of this invention is to provide a machine that will at one operation dampen, brush, hot and cold press, and roll or fold the cloth, or perform a part only of these operations, as may be required.

NEW HOUSEHOLD INVENTIONS.

IMPROVED HOUSEHOLD PRESS.

Henry W. Clum, Greenpoint, N. Y.—This invention relates to portable presses for expressing juices from fruits and for other similar purposes; and it consists of a standard or base piece, which is provided with a clamp for attaching it to the table, and upon the upper end of which a disk is formed, that is surrounded by a trough or channel that terminates in a spout. A yoke is jointed to ears at the sides of the said disk, and is provided with a screw, by which the power is applied. The advantages claimed for this improvement are that the press is compact, simple, and easily manipulated. The base piece elevates it so that a receptacle may be placed under the spout for receiving the liquid flowing from the press. The perforated bottom, supported by the internal rib in the hoop, affords means for the escape of liquid from the mass under pressure, and at the same time keeps the hoop down to its place.

IMPROVED DOOR CHECK.

John Francis, Waco, Texas.—This invention relates to a device for holding the door in open position, is readily applied to the door and worked without noise or jamming. The invention consists of a holder or knob, with recessed front end, attached to the base board, and of a countersunk door plate or case provided with a rubber block, that binds on the recessed parts of the holder to retain the door in open position. When the door is opened the block passes readily over the knob, and is retained by the recess of the same, so as to hold thereby the door in position. In closing the door the elastic block clears readily the recess of the knob by taking hold of the door, without requiring a special effort, forming thus a neat, simple, and reliable door-holding device.

IMPROVED STOVE.

Charles Lyman, Clarinda, Iowa.—The sheet iron body of this stove, together with the end pieces, form an elliptical drum, in which, between the end pieces, is placed a sheet of iron that is bent into a semi-elliptical form, between which and the body there is a flue. A firepot is arranged in the semi-elliptical part upon a plate that extends from one end piece of the stove to the other. The gate is provided with a number of tubular projections, which stir the fire and break up the clinker as the grate is moved. The stove may be filled either at the side or top, and the fire may be adjusted by poking it above the grate, between the fingers at the lower side of the pieces at the end of the firepot.

IMPROVED LAMP.

Nicholas F. Rigby, Winfield, Kan.—This invention consists in an open oil cup or chamber, attached underneath the font, being connected thereto by a descending tube with valve opened from the top of the font, the valve being so arranged as to close the exit tube when the font is filled, and open the same when the font is closed. The invention is based on the same general principles of the vacuum font as the German student's lamp, but is capable of being used as a bracket or stand lamp, chandelier, etc., supplying as many burners as desired with oil in regular and reliable manner.

IMPROVED ADJUSTABLE ROCKING CHAIR.

James R. Brumby, Marietta, Ga.—The object of this invention is to produce a chair which is strong and durable, and which may be readily adjusted to different positions, and folded together for storage or shipment. The chair is put into position for use by holding down the back end of the rockers and taking hold of the top of the back and raising it into the desired position. To place it in a reclining position the bottom is raised, which, by means of a cord, also raises a ratchet bar, and the back pressed down until it is in position.

IMPROVED IRONING APPARATUS.

Henry Monk, Troy, N. Y.—This invention relates to an improvement in the class of machines in which the article to be ironed is attached to a table that is adapted to slide beneath a heated roll or rolls. It also consists in a novel method of fastening the shirts to be ironed, and in an arrangement of gearing for driving the rolls and tables. The shirt is arranged at the opposite end of the machine, so that when the first one is discharged from the rolls, the second one is ready to be operated upon, and is introduced under the rolls while the machine is running in the reverse direction. Shirts are thus introduced into the machine first at one end and then at the other, in alternation.

IMPROVED ROTARY CHURN.

Lars Budahl, Spring Grove (Riceford P. O), Minn.—This invention consists in the combination of a rod, a bar or plate, a lever, and a slotted catch with the churn body and the cover; in the combination of a hook with the detachable dasher, and with the dasher shaft, and in the frame made in two parts to adapt it to receive and hold the pivots and dasher shaft of the churn. The object of this invention is to furnish an improved apparatus, which shall be so constructed as to enable the churning to be done easily and quickly, and which shall be convenient in use.

IMPROVED FAN ATTACHMENT FOR ROCKING CHAIRS, ETC.

Charles Krauss, Chicago, Ill.—The object of this invention is to furnish an improved fan attachment for chairs, rocking-chairs, cradles, and tables, which shall be so constructed as to be operated by the movement of the said chair or cradle while being rocked. A step and clamp, adjustable with each other, adapt the apparatus to be attached to a chair or cradle; and a combination of parts with a supporting bar enables the apparatus to be attached adjustably to a chair, rocking-chair, cradle, or table.

IMPROVED CLOTHES LINE HOLDER.

Richard Raby, Jr., Loudonville, O.—The object of this invention is to provide a clothes line holder which is capable of supporting a great length of line, which may be folded compactly together, and which is strong and durable. The advantages claimed for this holder are that it is simple and inexpensive, and is capable of spreading a great length of line.

IMPROVED LOCK FOR DOORS.

Elam Wike, Dayton, O.—This invention has reference to an improved burglar-proof door lock which locks the latch on throwing the key bolt, and the latch key and key bolt on throwing the night bolt, forming thus a superior safety door lock that cannot be tampered with from the outside, as the key cannot be pushed in, or a skeleton key inserted, or any one of the bolts opened. The night bolt cannot be thrown except when the key bolt is thrown, which forms a useful feature, as it prevents children from using the night bolt and locking the door when the same is not required to be locked. Thus a safety lock of simple construction is furnished, which is capable of producing a number of checks or safeguards by only two motions, namely, by the throwing of the key and of the night bolt.

IMPROVED FIRE ESCAPE.

Isaac H. Allen, Black Creek, Ontario, Canada.—This invention has relation to ladders which are especially designed for enabling persons to escape from the upper stories of burning buildings; and the nature of the invention consists in a flexible or folding ladder in which the rounds or foot rests are secured to strips of webbing woven in such manner that it affords proper strength and durability at points where the rounds pass through it. Studs or arms are fixed into the ends of the rounds for the purpose of enabling them to stand off from the wall far enough to afford a good foothold to a person ascending or descending.

IMPROVED KNOB FASTENER.

Oscar Mayo, Evanston, Ill.—This invention consists in a latch that is pivoted to the door, and is provided with a perforated ear that engages a a screw that projects from the socket of the knob and prevents the knob from being turned. The device is quickly and easily applied, it being only necessary to remove the screw that ordinarily holds the knob in the spindle and replace it by a screw having an elongated head, and to screw the latch to the door in the proper position.

IMPROVED STEAM DISH CLEANER.

Gen. Don C. Buell, Paradise, Ky.—This apparatus is designed for use in hotels and large restaurants, etc., and consists of a large zinc-lined case or box provided with revolving and removable racks for receiving or holding various kinds of articles of table ware, such as plates, soup-tureens, cups, saucers, spoons, knives, forks, etc. Pipes connect with the case and with perforated tubes arranged within the case in such manner that steam, hot water, or air may be impelled with great force, in the form of jets, upon the articles to be cleaned, while the latter are being revolved. The steam and hot water quickly remove the grease and other adhering foreign matter, and the blast of hot air subsequently admitted as quickly dries the articles. The racks holding the latter are then detached and the articles removed to make room for others requiring to be cleansed.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion.

The Complete Practical Machinist, by Joshua Rose, price $2.50. Address Joshua Rose, P. O. Box 5546, N. Y.

For sale cheap.—Carré Ice Machine, ½ ton capacity; used this season only. Address Enterprise Ice Company, Selma, Alabama.

Wanted—Agent to sell State Rights. S. R. Pay, Peoria, Ill.

Will take the Agency of or Manufacture on royalty for an old established trade, some patented kitchen furnishing or hardware article. W. C. Seavey & Co., Chicago, Ill.

Inventors—Send 25 cts. for "Journal of Invention," one year. Burke & Fraser, publishers, 37 Park Row, N.Y.

Split-Pulleys and Split-Collars of same price, strength and appearance as Whole-Pulleys and Whole-Collars. Yocum & Son, Drinker st., below 147 North Second st., Philadelphia, Pa.

Skinner Portable Engine Improved, 2 1-2 to 10 H. P. Skinner & Wood, Erie, Pa.

Emery Grinders, Emery Wheels, Best and Cheapest, Hardened surfaces planed or turned to order. Awarded Medal and Diploma by Centennial Commission. Address American Twist Drill Co., Woonsocket, R. I.

More than twelve thousand crank shafts made by Chester Steel Castings Co. now running; 8 years' constant use prove them stronger and more durable than wrought iron. See advertisement, page 142.

Machine Diamonds, J. Dickinson, 64 Nassau St., N. Y.

Best Pulleys and Couplings made; secured to shafts without keys, set-screws, bolts, or pins. Send for catalogue. Taper Sleeve Pulley Works, Erie, Pa.

Wanted—A small Tramway Locomotive. Address E. B. Seeley, Bowling Green, Ky.

For Sale—Engines, etc. One 10 x 16 portable, two 11 x 16 stationaries (one adjustable cut-off), one 7 x 12 farm engine; one 30 inch portable grist mill and bolt; three sets saw mill head blocks. All new, first-class, and cheap. Address T. L. Clark, Mt. Vernon, Ohio.

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For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

John T. Noye & Son, Buffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all kinds, and dealers in Dufour & Co.'s Bolting Cloth. Send for large illustrated catalogue.

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Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Reliable information given on all subjects relating to Mechanics, Hydraulics, Pneumatics, Steam Engines, and Boilers, by A. F. Nagle, M.E., Providence. R. I.

Notes & Queries

(1) E. A. G. asks: What is the number of strings used in common pianos, also the size and material from which the wire is made? A. There are generally three strings for each note, some of the lower notes having two or one. The strings are made of steel wire, and some of them are wound with fine copper or iron wire.

(2) T. & D. say: We have built a steam yacht, and are greatly disappointed in her speed. We want her to go at least 10 or 12 miles an hour. The hull of boat is 31′ in length, 6½′ beam, depth in center 3½′. We have a horizontal returned flue boiler 5′′ long, 30′ in diameter. Number of flues 44, 2 inches diameter, firebox width 26′′, height 18′′, length of grate 19′′. We have an upright engine 5 x 5. We have an eagle wing propeller 28′′ 3½′ pitch, and with a steam pressure of 120 lbs., 210 revolutions per minute, we gained 5 miles an hour. We can gain a greater speed by using a different propeller. A. We judge from your account that the machinery is not sufficiently powerful to obtain the speed you desire—as the propellers you have used seem to have worked with a very moderate slip, if, as we understand you, the speed was estimated when running against the current.

(3) D. E. S. asks how to make nitro-glycerin? A. To a mixture of nitric and sulphuric acids, successively add small quantities of glycerin. The nitro-glycerin falls to the bottom of the vessel. Acids of the purest quality should be used, and the introduction of foreign matters carefully avoided, otherwise slow decomposition may occur, which will result in spontaneous explosion.

(4) P. E. D. asks how to bleach Panama hats? Also how to dye felt hats black? A. To bleach Panama hats, wash the goods clean, and while slightly damp, expose to the fumes of burning sulphur in a closed vessel. To color one dozen hats, take 12 lbs. logwood, 1 lb. sulphate of iron, and ¾ lb. verdigris. Digest the logwood for some time. Add the sulphate of iron and the verdigris. Dip the hats in the bath several times and hang in the open air. By the peroxydisement of the iron with the atmospheric oxygen the hats will be more completely blackened. When fully dried wash thoroughly in running water.

(5) E. C. P. asks for a recipe for dyeing woolen pants black? A. To dye black, allow 1 lb. of logwood to each lb. of goods to be dyed. Soak the logwood over night in soft water, then boil it an hour, and strain the water in which it is boiled. For each lb. of logwood, dissolve 1 ounce of blue vitriol in warm water sufficient to wet the goods. Saturate the goods in this and then immerse in the logwood dye. Drain the goods and dry in the shade. When dry set the color by putting them into hot water in which has been dissolved a teacupful of salt to three gallons of water. Let the goods remain in until cold, then dry, without wringing out.

(6) C. W. W. says: I have been using plaster of Paris moulds for casting small objects in fusible metal. I find that the upper part of moulds does not fill as perfectly as the lower part, and that the metal becomes agitated even when the moisture is thoroughly excluded from the mould. A. See article on casting in fusible metal on p. 272, No. 17 of the SCIENTIFIC AMERICAN SUPPLEMENT. If the alloy is of low fusibility the mould should be sufficiently heated at the time of pouring in the metal to prevent too rapid cooling. If the mould is double, care should be taken to provide a sufficient number of air vents. The agitation is due to the escape of steam from the mould.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

R. F. G.—It is mostly iron pyrites with a little copper, but may contain more valuable metals.—S. M. S.—Answered August 11, p. 92.—C. A. C.—The shining scales are mica—a mineral consisting of silica, alumina, and potash. The other fragment appears to be a variety of serpentine—composed of silica, magnesia, and water.—Dr. M. P.—We could not well give an opinion as to the proper proportions of assay flux for the ore without having seen it. By following the rules you can best determine this for yourself by experiment.—W. T. J.—No. 1 is mica schist. No. 2 contains mica, felspar, quartz, and epidote (red)—a silicate of iron and manganese.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Man of War of the Future. By G. V.
On a Prehistoric Stone Wall. By J. C. W.
On the Axial Motion of the Earth. By J. P.
On the Postage Cancellation Problem. By H. P. S.
On the Adiabatic Curve. By R. A.
On a Curious Appearance of Aniline Red. By W. J. W.
On the Medicinal Uses of Chalk. By T. C. T.
On a Problem of Circles and Lines. By J. M. R.
On Geometrical Problems. By K. N. H.
On Bees and Hives. By Mrs. L. E. C.
On Leaks in Gas Pipes. By M. A. J.
On Carving a Base Ball. By T. E. H.

Also inquiries and answers from the following:

A. H. P.—E. B. E.—A. L. R.—F. B. S.—J. L. S.—W. D. S.—J. O. G.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes machines for cutting veneers? Who publishes books on torpedoes and explosives? Who makes or sells lubricants for heavy machinery?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL.

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FOR WHICH

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July 24, 1877,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

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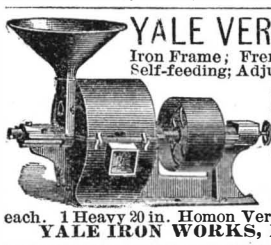

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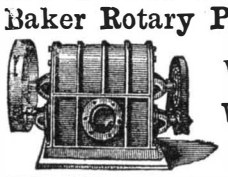

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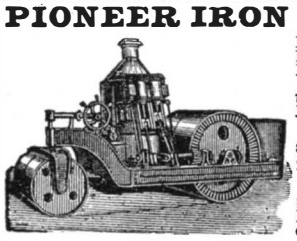

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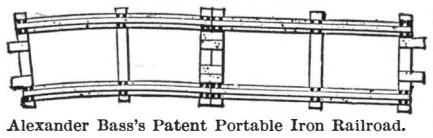

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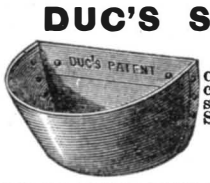

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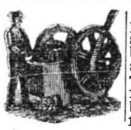

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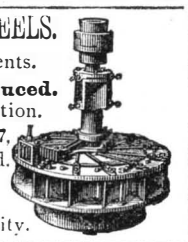

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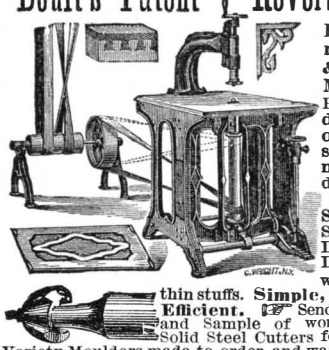

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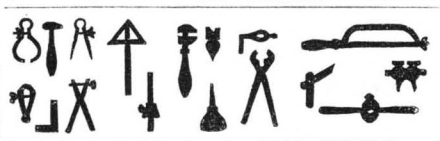

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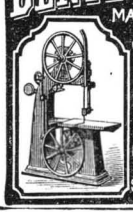

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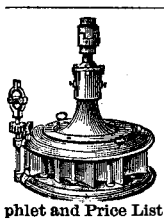

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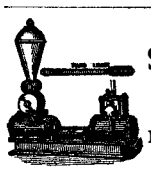

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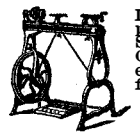

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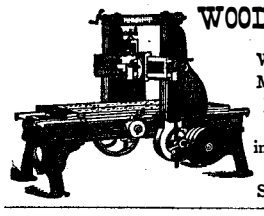

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